

A QUALITATIVE CASE STUDY
OF PROGRAMMED COMPUTER-ASSISTED INSTRUCTION
IN A COLLEGE COURSE DELIVERED ONLINE

A Dissertation
Presented to
the School of Education
Drake University

In Partial Fulfillment
of the Requirements for the Degree
Doctor of Education

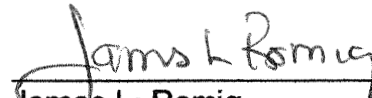
by B. J. Reed
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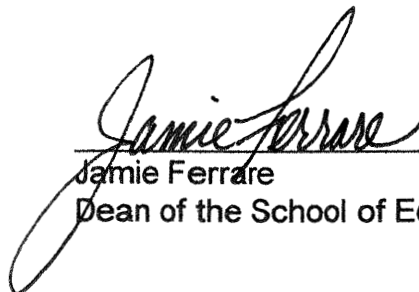
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An abstract of a Dissertation by
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May 1999
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The problem. Can online (computer-assisted) college instruction, using theoretically sound instructional design, provide rich instructional interaction without sacrificing time efficiency? What are some of the barriers and benefits encountered with online instruction?

Procedures. A naturalistic inquiry, this case study focused on two sections of a course titled "Principles of Communication" at a Midwestern, private, liberal arts college. Participants were two professors and 39 undergraduate volunteers. The case study examined five weeks of online course activity, where students engaged in 14 online exercises, weekly assessments of activity, two performance tests, and four group interactions online, while reading the assigned text.

Findings. The case study revealed that rich interaction could be achieved online, that performance standards were satisfied, and that the course could be time efficient (with a mean of 45 minutes less per week spent on course activity). Barriers encountered included: equipment failure, inadequate software, inadequate teacher preparation, inadequate resources, human error, time inefficiencies, and a lack of spontaneous interaction. Benefits encountered included: entertainment value, learning value, convenience, development of computer skills, development of Internet skills, and development of student responsibility.

Conclusions. Beyond the findings, several conclusions could be drawn from this case study that might improve the theoretical framework used to create this online course. Those conclusions include: 1) provide adequate contingencies to encourage non-linear investigation where feasible; 2) distinguish relationships between interactive exercises and instructional objectives through sound instructional design; 3) provide adequate contingencies to require mastery of each unit before allowing a student to proceed; 4) require effective communication in student responses where feasible; 5) provide an adequate range of cognitive processing levels (low to high) to establish student performance at accepted standards; 6) provide adequate support technicians and resources (including thorough backup systems) from host institution; 7) empirically test interactivity to establish if practice provided will optimize time efficiency while remaining sufficient to achieve student performance at selected standards.

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Chapter 1

Introduction

This study examined a college communications course, delivered online, utilizing a theoretical framework of programmed instruction and additional recommendations located in applied research. While the course relied on a textbook, group work, and other in-class exercises, this study focused only on the online portion, roughly one-third of a traditional 15-week semester. Unlike many other studies, the fulcrum here was not student achievement (a single measurement of effect), but interaction and efficiency (two alternative measures of effect). Interaction is an ill-defined concept, but for this study interaction was examined from the perspective of how students and instructors work with, evaluate, relate, and react to the online portion of the course. Efficiency, another ill-defined concept, is conceived as a product of time well spent. Since student achievement is not a factor in this analysis, "time well spent" was determined by the students and the instructors. This researcher investigated if online (computer-assisted) college instruction, using theoretically sound instructional design, provided a rich instructional experience (interaction), without sacrificing (time) efficiency.

Before examining the issues inherent in online or computer-assisted instruction in adult classrooms, developing a list of terms will be helpful, as educational disciplines use different terms and several terms have been used with contradictory implicit meanings. In an article about the instructional design discipline, Barbara Seels (1989) wrote, "The resulting lack of clarity of definition

and relationships generates much confusion, especially with those outside the profession. Yet in the final analysis the definition question may be found to be trivial, for the field of instructional design and technology will continue to grow. How the terms are defined is unlikely to have a significant effect on this growth" (p. 14). This researcher believes the question of definitions is not trivial, in that sharing knowledge across disciplines is hampered when jargon is misunderstood or misapplied. Synthesizing a theoretical framework for instructional design, based on the information gained through research, has been difficult and application of such a theoretical framework has been rare. This rarity may be directly attributed to the lack of clear communication from researchers to those who could most benefit from their insights.

Researchers in education often refer to "computer-based instruction" (CBI) or "computer-mediated communication" (CMC). Educational researchers may also substitute "learning" for the word "instruction" (so readers may find CBL instead of CBI). Researchers in psychology may use CBI or "computer-assisted instruction" (CAI). Researchers in applied corporate settings use "training" in place of "instruction," leading to acronyms like CBT. Instructional design research -- whether from education or psychology -- might focus on CBI (CBT), CAI (CAT) or "programmed instruction" (PI). Most disciplines tend to use "traditional instruction" (TI) to indicate an instructor-lead classroom activity (usually lecture) but not necessarily an interactive activity.

Across disciplines, the following terms are in common use: "CD-ROM" (referring to a disk which holds computer codes to impart content, typically multi-

media in nature), "CD-i" (meaning compact-disk interactive, utilizing a CD-ROM and a special "mini-computer" unit to interact with the content), "WWW" (World Wide Web), "Net" (usually in reference to the Internet), and "intranet" (in reference to a network among specific computers and/or computer systems).

The instructional design terms used in this dissertation follow the selected interpretations below, but quotes from selected writings may not utilize these same definitions.

Computer-mediated communication. CMC is a general term that refers to any use of computerized technology to communicate with (but not necessarily instruct) one or more receivers (e.g., the Internet is a form of computer-mediated communication); CMC does not imply interactivity (see "interactivity" definition).

Computer-mediated communication is the exchange of information between persons by way of computer networks; this can be all kinds of information, for example text, images, audio, and video. The exchange of information can be real time communication or synchronous, this means that people are communicating with each other at the same time. Another form of communication is asynchronous, this means that people are communicating at different times. They can send and receive their messages at any time they want. (Huizen, 1998, para. 3)

Computer-based instruction (or training). CBI (or CBT) refers to the educational use of a computer, typically connected to an intranet and/or the Internet, where the bulk of content is delivered through the computer, rather than through a textbook or face-to-face interaction with the instructor and other students; CBI may utilize a variety of technological tools (CD-i, CD-ROM, WWW, etc.); CBI typically implies interactivity, although interactivity is not always present.

Computer-assisted (or "aided") instruction. CAI is similar to CBI, but content is delivered through additional tools, such as a textbook and/or classroom instruction, rather than just by the computer system, often using aids such as computerized syllabi, connections to preferred Web sites, or computerized study guides; CAI does not imply interactivity, although it could be interactive.

Programmed instruction. PI refers to computerized instruction or any other form of content delivery (even a lecture), as long as the instruction follows the criteria for "programmed" content, where students are introduced to information, utilize the information in practice, and then demonstrate appropriate use of the information. Failure to meet the criteria may leave the student with information, but not understanding or an ability to apply the information appropriately. CBI might fail to be PI, whereas a skillfully written textbook could meet the PI criteria. PI requires interactivity. Susan Meyer Markle (1990) utilized programmed instruction in her textbook Designs for Instructional Designers, as she both defined and modeled the concept. Her text stands as an example of how programmed instruction -- interactive instruction -- can be used in a textbook. On the other hand, tutorials provided by many computer software programs often lack interactivity (Markle called that "covered content," not "programmed"). Macromedia's (1996) CD-ROM program titled Authorware Academic provides an example of CAI utilizing programmed instruction; the CD-ROM provides interactivity to supplement the tutorial booklets.

Traditional instruction. TI applies to instructor-lead classroom interaction, where the most common instructional tools include a text, lectures, and students in chairs. While students may need a computer to successfully complete assignments, the computer is not used as a content-delivery tool. Usually, TI does not imply interactivity during lectures or in the textbook, but interactivity is possible with TI.

Interactivity or interactive instruction. France Henri (1991) presented a framework to help educators utilize effective CMC for instruction. Although Henri suggested that all CMC should be interactive, she recognized the quality of interactivity could be diminished without an operational definition of the term. She offered a detailed analytical model for interactivity (see Table 1). This table identifies explicit interaction (where the message specifically refers to previous communication), implicit interaction (where the message builds upon previous communication, but does not directly refer to that communication), and independent statements (which do not instigate nor provide a response).

Markle (1990) went further with her description of interactivity, describing not just the breadth of interactivity as Henri's (1991) table did, but the depth of interactivity. Markle suggested that "activity" is responsive, but educators seek a demonstration of more than that; educators want evidence that students understand the content. She wrote, "To show understanding of the definition of a concept, a learner must apply it to examples and nonexamples. Copying the name of the concept, or taking the words down in notes are not indicators of understanding the definition" (Markle, 1990, p. 4). According to Markle, just any

Table 1

Analytical Model for Interactivity

Category	Definition	Indicators
<u>Explicit</u> <u>Interaction</u>	Any statement referring explicitly to another message, person, or group	
Direct response	Any statement responding to a question, using a direct reference	"... in response to Denis's message 16 ..."
Direct commentary	Any statement taking up and pursuing an expressed idea, using direct reference	"... I share Nicole's opinion absolutely ..."
<u>Implicit</u> <u>Interaction</u>	Any statement referring implicitly to another message, person, or group	
Indirect response	Any statement obviously responding to a question, but without referring to it by name	"... I think the solution is ..."
Indirect commentary	Any statement taking up and pursuing an expressed idea, but without referring to the original message	"The problem under discussion will need the assistance of ..."
<u>Independent</u> <u>Statement</u>	Any statement relating to the subject under discussion, but which is neither an answer nor a commentary and which does not lead to any further statements	"After examining the problem I think that ..."

Note. From "Computer conferencing and content analysis," by F. Henri, 1991, in A. R. Kaye (Ed.), Collaborative learning through computer conferencing: The Najaden papers, p. 127. Copyright 1991 by Springer-Verlag.

activity won't do. She dictated that effective interactivity demonstrates understanding as well as ability to successfully apply the information, promotes active rather than passive action, requires overt rather than covert action, and encourages meaningful responding. She demanded, "You, the instructional designer, will select which cases the learner will work on so you are fully in control of how meaningful the learner's activity will be" (p. 8). Markle also distinguished between "busy work" and meaningful responding. She suggested that many instructional designers require responses that are unnecessarily burdensome (busy work) for the learner, "There are dozens of overt indicators you can use to have the learner indicate the decision -- circling, underlining, checking 'yes/no' or 'is/isn't', labeling the example, etc." (p. 8). She also criticized the use of paraphrasing as a response mechanism, "Any response request asking for a paraphrase seems more meaningful than a verbatim one to most of us, but it is full of deep semantic perils . . . Judging that the paraphrase is good requires a high-level of skill and effort from the teacher, making grading essay tests such a chore and so subjective" (pp. 13-14).

Hypertext or hypermedia. In a work titled Hypertext, George Landow (1992) defines the concept and uses of the computerized information retrieval system known as "hypermedia." Landow's definition includes:

Hypertext... denotes text composed of blocks of text and the electronic links that join them. "Hypermedia" simply extends the notion of the text in hypertext by including visual information, sound, animation, and other forms of data. Since hypertext, which links a passage of verbal discourse to images, maps, diagrams, and sound as easily as to another verbal passage, expands the notion of text beyond the solely verbal, I do not distinguish between hypertext and hypermedia. (p. 4)

This study used hypertext and hypermedia as interchangeable terms, following the definition posited by Landow.

Background

A revolution is underway in the 1990s, a revolution that has been building for many years, leading practice in higher education to exciting, developing, and yet unexplored territory. This revolution is being adopted enthusiastically by male and female, young and old, college professors and students across disciplines, across the world. The essence of the upheaval is to incorporate emerging technologies into instructional design -- leaving students to be "active agents in the process of learning, not as passive recipients of knowledge from teachers and authoritative texts" (Rudenstine, 1997, p. A48).

The scope of this revolution could be more dynamic, more influential on educational practice than any other in this century. Author Sara Kiesler (1991) wrote, "When technology is more than just amplifying and brings about qualitative change in how people think about the world, in their social roles and institutions, in the ways they work, and in the political and economic challenges they face, we say it has transformative effects" (p. 148). Computer-mediated communication has become transformative, perhaps shown most dramatically in the development and expansion of the World Wide Web. As education drives this communication system, and as education relies more heavily on the Web as an instruction delivery tool, the transformational effect of CMC will certainly grow.

The revolutionary promise is that students will engage content more enthusiastically, will learn more, will gain more breadth or richness of content, will retain more, and eventually will become better practitioners. Landow (1992) wrote in support of CMC, urging the use of online resources to improve instruction: "Hypermedia linking, which integrates scholarship and teaching and one discipline with others, also permits the faculty member to introduce beginners to the way advanced students in a field think and work while it gives beginners access to materials at a variety of levels of difficulty" (p. 125). Perhaps more importantly to colleges, educators anticipate more students can be accommodated with these technologies, as colleges face declining enrollments in an increasingly competitive marketplace (Porter, 1998).

Harvard University President Neil Rudenstine (1997) argued for the potential of the Internet in the well-read Chronicle of Higher Education:

Is the educational promise of the Internet real? I believe it is. The cluster of technologies that we know as the Internet powerfully reinforces and extends some of the most effective traditional forms of university teaching and learning. On many campuses, it is already having an impact, more dynamic and pervasive than that of any previous breakthrough in information technology during this century. And the transformation in progress is only beginning to unfold. (p. A48)

The revolutionary influx of computers in education has not been supported by all practitioners. Hill and Somers (1996) wrote, "Proponents of greater use of technology in education are not without critics. Over the past four decades, at least two earlier waves of educational technology failed to meet expectations" (p. 300). The authors explain how television failed to become the preferred method of instructional delivery and although computers were readily adopted, rarely

were computers used in CBI formats. More often the computer was used for word processing, spreadsheets, and desktop publishing applications in a CAI system. Even critically acclaimed multi-media and the potential for meaningful interactivity has not replaced traditional instruction in a majority of schools. The application of hypermedia is growing, however, and that growth may be as exponential as the growth of the World Wide Web itself.

Programmed instruction and CAI should not be confused; these are different tools offering different advantages and disadvantages. The decision to use CAI over other methods of content delivery must be made on the basis of logical comparison. Wesley, Krockover, and DeVito (1985) wrote, "...in order to justify the selection of one over other, less costly alternatives, data must be collected that demonstrates a clear learning advantage for CAI . . . programmed texts may be less costly and still provide the same high amount of structure, self-pacing, and time savings . . ." (p. 688). These authors suggested that while CAI and programmed instruction have commonalities, they also have differences. Programmed texts can be more portable. CAI typically provides immediate feedback without the need to turn pages. CAI or CBI can prevent the tendency to race (defined as moving ahead in the organization of content, like reading the end of a novel before reading the rest), but programmed texts and most hypertext systems allow learners more freedom. On the other hand, programmed texts cannot force the learner to read through feedback, so the student may miss the correct response information, and programmed texts do not force the student to respond actively and overtly. Wesley et al. stated,

"Bypassing sections (in CAI) is not possible as it is with a programmed text. Additionally, students using CAI may be prohibited from gaining access to correct answers before actually composing their own responses" (p. 688). The "inherent" advantages (or disadvantages) of any instructional medium are dependent upon instructional design strategy, but the medium itself may impose some limitations on that design.

William Culmer (1997), writing a dissertation on CMC, stated, "The fundamental premise of this research is that hypertextual computer technology allows learners to network both people and information on a global scale in an active, student-centered environment [and] possesses profound implications for the ways...students can learn" (p. 6). This compelling belief in the potential of CMC has inspired many schools to test the efficacy (based on student achievement) and efficiency (based on a variety of measures, but typically referring to cost or time measures) of technology in the adult classroom.

As researchers continue to focus on the process of employing instructional technology, practitioners can expand their instructional tool-bag, indeed creating richer content with more effective instructional strategies. CMC will allow practitioners to abandon methods that appear, at least on the surface, to be less effective and less enthusiastically received by students raised on television, video recorders, compact disks, and computers:

In many curricula, the traditional classroom experience is best characterized as a "sage on the stage" activity. If the "sage" is simply transferred to a set of video and/or audio clips, we have a "sage in the box" that can be viewed from anywhere and at anytime. While capturing the traditional classroom experience in a box is readily understandable, ALN (asynchronous learning networks) can be much more. We can add

the capabilities of tying geographically distributed people together, facilitating learning with different modalities, permitting time and place shifting, rapid feedback, on-line simulations and laboratories, and a host of yet unexplored capabilities. The potential of ALN for changing the way education is delivered and the way people learn is tremendous. (Bourne, McMaster, Rieger, & Campbell, 1998, p. 1)

Several schools are experimenting with delivery of courses through CMC, and the number of courses being delivered online is growing rapidly. Bourne et al. (1998) stated, "Faculty efforts in creating the on-line courses range from syllabus creation to building extensive on-line interactive materials" (p. 2). While research is becoming increasingly available, both online and through traditional channels, much remains to be explored:

So in education, the possibility (and desirability) of creating and using technologically based systems for teaching, learning, and provision of educational sources are typically seen as basically transparent questions. Should we purchase and install large numbers of computers in the nation's classrooms? Should children use on those computers widely available commercial software packages (word processors, spreadsheets, databases, etc.)? Should we encourage design, creation, and installation of a variety of new, multi-media instructional programs? Should we connect increasing numbers of schools, teachers, and students to the Internet? In almost every case, we answer "yes" before we can fully comprehend the costs or time involved, much less the more fundamental issues of learning, development, or social organization where the impact of these decisions may be felt. (Kerr, 1996, para. 4)

Indeed, the costs associated with online technology can be extensive and should be carefully considered. Porter (1998) cautioned, "...professional development should be an ongoing requirement for persons involved with distance learning. They must be aware of the way technology is evolving and how distance learning programs are changing the nature of education . . ." (p. 198).

The host institution's support for online instruction would include much beyond the initial purchase of online course development consultation and/or purchase of appropriate hardware and software. Beyond professional development issues suggested by Porter, the host institution may need to allow additional time for faculty to build online instructional materials and then to update those materials. Porter optimistically predicts a growing number of students seeking higher education will propel collaborative initiatives between higher education, business, and industry. Increased competition for students, however, may force leaps into distance education via the Internet before adequate preparation takes place, before higher education institutions can build appropriate infrastructures and support mechanisms.

In the rush to absorb computer technology in the educational process, sound instructional design may be overlooked. An article appearing in The Chronicle of Higher Education, for instance, reported a study conducted at California State University looking at the efficacy of CBI. The article claimed the researcher found "wired students outscored their traditional counterparts by an average of 20 percent" (McCollum, 1997, p. A23). However, the article went on to claim the researcher had failed to control for an extraneous variable (collaboration between on-line students) and hoped to conduct future research where "he plans to require the same group exercises of the students in both traditional and virtual classes" (p. A23). A significant number of educators read this publication and may be tempted to follow the researcher's forays into CBI, based on this simple review of his work. Beyond failure to control for significant

intervening variables such as collaborative learning and instructional design, efficacy studies throughout the CBI field often fail to build carefully designed instructional environments, and unsuspecting educators may follow these designs.

This consideration is the basis of an article by Glenn Snelbecker (1987), where many of his concerns remain current more than a decade later: ". . . many teachers are not well informed about the range of publications or the topics addressed in the instructional design literature. Another contributing factor involves problems that are encountered when identifying teaching skills in general and instructional design skills in particular" (p. 34). Snelbecker suggests many educators believe teaching skill cannot be defined, therefore cannot be taught, and attempts to do so will be counterproductive. Frequent failures in new educational initiatives and a common dissatisfaction with public education in general are often offered as evidence to these assertions.

Many researchers have focused on the instructional design process, others on instruction delivery tools; several have examined the impact of these new technologies on professors, while few have considered the impact on student behavior. However, Bourne et al. (1998) discussed this consequence of CMC:

We determined over the course of the semester that students, when given the option, will not come to class unless there is something happening in the class that will directly impact their grade. As the semester progressed, we found that once students understood that materials provided at the face-to-face question and answer session were available on-line, they stopped coming to class. Further, they started submitting their questions asynchronously. Students in project teams often met at class time for a face-to-face session since that time was pre-scheduled. (p. 13)

Culmer (1997) examined a doctoral cohort using CMC over six months: "Of particular interest is how the amplifying and transformational change made possible by the technology of the World Wide Web translates into student learning" (p. 6). He found that students appreciated the experience, found Internet links useful, and felt the CMC aspect of the course helped reduce anxiety regarding the lack of social contact experienced by students engaged in distance learning. Culmer concluded that this CMC experience was as effective as other instructional methodologies. CMC has not always received such positive reviews in applied research.

In an attempt to explain the discrepancies found in CBI effectiveness research, Heinrich, Molenda, Russell, and Smaldino (1996) stated:

Research projects comparing media treatments with so-called conventional instruction frequently conclude that there is "no statistically significant difference" in learning between the media-based and conventional instruction. Does this mean that audiovisual presentations are equivalent to lectures? Not necessarily. It may mean that when certain audiovisual materials are used in the same way as a lecture is used (e.g., for verbal recall of information), the outcomes will be similar when observed over a range of learners. There needs to be some consideration for such variables as the presence of a creative instructor in the learning experience. (p. 27)

To determine if an instructor is creative, a standard must be set, against which instructional behavior can be compared. To determine the efficacy and efficiency of CBI, an examination of how students interact with instructional content is also required, such as in the Culmer (1997) study. If we must account for the variable of a "creative instructor" as Heinrich et al. (1996) suggested, we should also account for the presence of "creative learners" in the educational

experience. How does CBI impact learning and study behavior? Do students interact unpredictably with CBI treatments and enhance the effectiveness of this educational tool?

Heinrich et al. wrote, "The effective use of media demands that instructors be better organized in advance, think through their objectives, alter the everyday classroom routine, and evaluate broadly to determine the impact of instruction on mental abilities, feelings, values, interpersonal skills, and motor skills" (p. 28). Perhaps a similar list of prerequisites could be constructed for students who will be utilizing media in the learning process. Should students be better organized, more disciplined, armed with clear objectives, flexible to alterations in the everyday routine, and capable of absorbing the impact of CBI on their mental abilities, feelings, values, interpersonal skills and motor skills? If instructors need adequate preparation to make effective use of media, perhaps the same consideration is true for students.

Considerably more data were located testing the efficacy of CMC in work with children than in work with adults. Literature reviewed for this dissertation had adult subjects and that criterium was selected as the focal point because this researcher supports the theoretical position that adult students have unique learner characteristics. Malcolm Knowles (1984) stated in The Adult Learner:

We feel that the current and future learning needs of adult learners represent an important and growing focus in the use of educational technology for self-instruction. Our observations of self-directed adult learners using CAI to enhance their professional competence and personal development, suggest that there are specific criteria applicable to the evaluation of self-instructional materials for adult learners. While several criteria could apply equally well to younger learner populations, many are more closely related to certain characteristics of adults as

learners, for instance, changes in self-concept, dependence on personal resources of experience, developmental life changes demanding new learning, and interests in what is immediately applicable. (p. 41)

Statement of the Problem

Can online (computer-assisted) college instruction, using theoretically sound instructional design, provide rich instructional interaction without sacrificing time efficiency? Using the Bourne et al. (1998) paradigm for online instruction, how do participants interact with the course? What is the range of time-efficiency for the selected paradigm and how will participants evaluate time spent? What are some of the barriers encountered with online instruction? What are some of the benefits encountered with online instruction? Are any of the revolutionary promises for CMC in higher education supported by this case study?

The paradigm. Bourne et al. (1998) attempted a case study in the design and delivery of an asynchronous course and wrote this problem statement, "What are the possible paradigms for on-line learning? What are the ways to implement on-line courses? What organizational structures are possible? How well does ALN scale up ('scale-up' means being able to increase the student/faculty ratio while maintaining quality education); should ALN be combined with synchronous methods?" (p. 2). These questions are important issues to consider in the ongoing effort to integrate technology and education. The paradigm of this case study, based on the description provided by Bourne et al., includes: (a) use of computer conferencing for submission of homework, discussion of issues, help; (b) online materials that include a syllabus, assignments, and interactive learning modules; (c) course management which includes homework submission,

assessment, and grading; (d) and interaction with students through e-mail and listservs. (p. 3)

The interaction. Based on selected recommendations from applied research and the theoretical foundation posited by Markle (1990), this case study employed a textbook and interactive learning modules delivered online. Other than initial class meetings held as orientation to the course and the computer, the online section of the course was asynchronous. The interactive learning modules and assessment exercises were based on the definitions of interactivity offered by Henri (1991) and Markle (1990).

Time efficiency. Students were asked to evaluate time-efficiency in assessment exercises. This researcher evaluated time-efficiency in a journal and interviewed another professor teaching the same course in a separate section during and within two weeks following the online section of the course (one-third of the semester). Time-efficiency remains an ill-defined concept and care was taken to determine how participants defined this concept as well as how they evaluated their time interacting with the course. This researcher anticipated an emerging definition of time efficiency, based on naturalistic inquiry methods suggested by Lincoln and Guba (1985, p. 224).

Revolutionary promises. Through assessment instruments, this study sought to establish any benefits the participants discovered through online instruction. This study also explored any barriers participants encountered as they interacted with the course online. Through this case study, the instructors

sought evidence that the revolutionary promises for online, computer-assisted instruction are realistic and within reach of most college communities.

Chapter 2

Literature Review

A review of existing literature for this study proved difficult due to the expansive list of ill-defined descriptive labels. Further, the literature available across those descriptive labels is vast, yet individual research studies rarely approach computer-mediated communication from comparable perspectives, following similar research designs. The breadth of knowledge in the CAI field is growing, yet is rife with gaps in the accumulated information. Much remains to be discovered. The research does not clearly define the richness of a CAI experience, from the instructor's and the learner's points of view, nor have all the unique characteristics of CAI been thoroughly examined. While many areas have been explored to great depths, such as the concept of CAI effectiveness (e.g., Bradley, 1994; Clark, 1985; Crosbie & Kelley, 1993; Culmer, 1997; Khalili & Shashaani, 1994; Kulik, Cohen, & Ebeling, 1980a; Kulik & Kulik, 1988; Kulik, Kulik, & Cohen, 1980b; Kulik, Kulik, & Schwalb, 1986; McMinn & Foster, 1991), other areas, such as following the compelling design attributes of highly successful computer games, have not been explored in detail:

One could argue that a game is a type of instructional overlay in that it provides a structure for helping the student to monitor goals, feedback, and outcomes. On the other hand, many students may focus so much on completing the game that they are distracted from reflecting on the underlying principles. Future researchers are also advised to consider a blending of quantitative and qualitative methods to best understand how students interpret different feedback representations in relation to learning strategies they develop over time. (Rieber, 1996, p. 21)

Popular media have begun to explore these gaps, working faster than empirical research tends to, as empirical research must adhere to rigid, time-consuming guidelines to ensure quality and applicability of the research findings. The writers of popular media have no such constraints to slow their explorations. Corporate trainers, also generally free from the time-consuming restraint of careful research, are turning to game programmers, seeking critical talent to develop effective, compelling, and efficient training materials:

If you're wondering why anyone would want to adapt computer games for training, wake up and smell the burning toast. The virtues of self-paced, computer-based training have been trumpeted for years, but the majority of actual CBT products have always been disappointing -- flat and boring as a really bad lecture or an even worse workbook. In these 'page turners' you merely progress from screen to screen, reading text, answering questions, and occasionally biting your own flesh in order to stay awake. (Filipczak, 1997, p. 26)

Computer games garner an almost compulsive audience; children and adults clog the aisles of local computer game establishments. Creators of instructional media rarely complain of students who cannot seem to put the game aside to accomplish other tasks, like eating and sleeping. Capturing the appealing features of computer games and applying those features to instructional media could enhance instructional design dramatically. This researcher found few studies with a visual design focus and no studies that examined computer games utilizing sound instructional design.

Adhering to advice provided by Gros, Elen, Kerres, Merrienboer, and Spector (1997), the current study was based upon an instructional design model posited by Markle (1990) and a review of the literature that supports and/or enhances Markle's recommendations. Markle's model is a recipe for

programmed instruction, regardless of the medium (textbook, lecture or CBI), and was selected primarily because the recommendations appear to be logical and often based on acceptable theory. However, this literature review was undertaken to establish if research supports and/or enhances Markle's recipe. Selection of these studies was based on the following criteria established by this researcher, to provide a focus in this literature review on instructional design practices in adult education:

- subjects were "adult" students, with the vast majority of subjects in underclass college courses and a small percentage of studies with subjects in high school, graduate, or professional training courses;
- independent variable(s) in selected quantitative studies represented a manipulable aspect of instructional design;
- dependent variable(s) in selected quantitative studies represented an aspect of efficacy and/or efficiency in CAI or CBI;
- selected qualitative studies focused on efficacy and/or efficiency of CAI or CBI;
- and the instructional delivery method was CAI or CBI using personal computers, compact disk-interactive, the Web, or any other appropriate computer-based technology.

Since CMC research is necessarily recent, the majority of studies in this literature review (58 percent) were published in the 1990s, only about one third (38 percent) were published in the 1980s, and a few significant studies (6 percent) were reviewed from the 1970s and 1960s.

Evaluation of Existing Literature

Several studies do not support a claim of superiority for computer-based instruction (Casey, 1996; Grabe, Bordages, & Petros, 1990; McMinn & Foster, 1991; Sawyer, 1988; Wesley et al., 1985). Such studies exhibit varying levels of methodological quality and generalizability.

Casey (1996) studied a multimedia training program for weather forecasters interpreting Doppler radar. His interest was whether a CBI program could replace the cognitive advantages of mentoring and community. He found, "Cooperative learning environments seemed more successful than individualized learning environments. Learners reacted negatively to hypertext without a cognitive organizing framework" (p. 81). The study discusses cognitive apprenticeship, defined as a methodology for presenting content authentically, involving the learner actively, sequencing the learning experience logically, and orienting the learning experience appropriate to the learner's environment. Much of the theoretical framework for cognitive apprenticeship has been built on research with varying levels of quality and conflicting findings, as is the research in the field of CBI.

Grabe et al. (1990) conducted an interesting project on the impact of computer-supported study on student awareness of knowledge, with the premise that students must regulate study behavior by studying until ready for exam performance and stopping their study behavior when mastery has been achieved. Their approach aimed not just at efficacy, but also at the efficiency of CAI, an aspect of CAI that has been neglected in research. The study revealed

students gained an advantage with CAI on the first exam, but the benefits declined across the span of the course. Students were also unable to accurately predict exam performance, based on their performance with CAI; the authors suggested this finding might support the construct that students base exam performance predictions more on past exam performance than on "specific metacognitive processes" (p. 117). The students simply may have found predictions based on past exam performance were more efficient than relying on specific metacognitive processes.

McMinn and Foster (1991) tried to teach non-sexist language to students using a computer program, but found the behavior of using sexist language (female nurse and male business executive stereotypes, for instance) was resistant to change with the program under study. They suggested a more powerful intervention could be a combination of CBI and traditional instruction (or a CAI intervention). However, their study results contain a threat to validity: the test administered did not test the effectiveness of computer-based instruction, but the level of effectiveness for the specific content and response requests used. Student reliance on stereotyping may be resistant to change because stereotyping, though occasionally faulty, is by its nature efficient. Stereotyping is the formation of a simplified concept or image reinforced by culture and experience, an efficient form of communication in society. Absorbing the corrective intervention would not be as efficient as clinging to the culturally-sanctioned stereotype.

Sawyer (1988) found no advantage to computerized versus conventional study guides, but failed to control for students in both groups who used no study guide or students who used both study guides. Failure to control extraneous variables may be common in classroom-based research and, as Kulik and Kulik (1988) pointed out in their meta-analysis, we need more research that is well designed and which does control for extraneous variables.

Wesley et al. (1985) examining CAI and a text-based version of PI, discovered "interaction analysis shows no benefit of either mode of instruction for internal or externally controlled students" (p. 694). Their subjects were 81 preservice elementary teachers in a science methods class. The results were at least in part suspect because several students "offered unsolicited comments that they had already learned a number of the skills taught in the study in an earlier requisite course" (p. 695). Worthy of consideration, however, is the author's conclusion: "These findings suggest that incorporation of CAI into a science methods class for preservice elementary teachers may help them gain computer literacy as they learn science content" (p. 695). When the method of instruction -- computers, for instance -- represents a learning outcome, perhaps the methodology is warranted, regardless of the potential for superior efficacy in subject matter mastery.

Hannafin, Phillips, and Tripp (1986) studied the application of interactive video on orienting, processing and practicing activities. The authors stated:

While unique instructional attributes may exist, research thus far has failed to detect the differential effectiveness of interactive video versus competing instructional systems. Research focusing on systematic variations in the design of interactive video, on the other hand, has yielded

consistent evidence in support of more generalizable and powerful instructional features. (p.138)

This position, that CBI may not be more effective, but may offer unique characteristics for effective instructional design, may be the best that researchers can claim on the efficacy issue. Yet, many researchers over the past 20 years have taken the position that CBI is more effective than other instructional methods.

Kiesler (1991) referred to another weakness inherent in CMC research, a problem of unanticipated side effects developed by treatments. She wrote, "Using computers for instruction can unintentionally change many important aspects of life in education. For example, in one experiment, courses specifically designed to allow students to learn in an individualized manner at their own pace also caused heated competition between students. Another software program designed to reduce competition ended by increasing it" (p. 162).

The effectiveness of CBI may be established, if not by an overwhelming majority, at least by a majority of studies, and if not by a large margin (in comparison to traditional methods of instruction), at least by a statistically significant margin (Bradley, 1994; Ester, 1994-95; Grabe, Petros, & Sawler, 1989; Greene, Kincade, & Hays, 1994; Khalili & Shashaani, 1994; Kulik, Cohen, & Ebeling, 1980a; Kulik & Kulik, 1988; Kulik, Kulik, & Cohen, 1980b; Kulik, Kulik, & Schwalb, 1986; Martin & Bramble, 1996). This compilation of evidence, however, is not without criticism. Richard Clark (1985), examining many of the efficacy studies mentioned in this literature review, suggested confounding variables mar the research:

A thirty percent sample of the computer-based instruction (CBI) studies meta-analyzed by Kulik et al. [Kulik, Kulik, & Cohen, 1980b] was examined for evidence of confounding. The purpose of the analysis was to explore the validity of competing claims about the contribution of the computer to measured achievement gains found in CBI studies. The result of the analysis strongly suggests that achievement gains found in these CBI studies are overestimated and are actually due to uncontrolled but robust instructional methods embedded in CBI treatments. It is argued that these methods may be delivered by other media with achievement gains comparable to those reported for computers. (p. 249)

Indeed, Kulik, Cohen, and Ebeling's (1980a) meta-analysis examined the effectiveness of programmed instruction in higher education, rather than CBI. Programmed instruction, according to enthusiasts such as Markle (1990), can be delivered via a textbook, or other traditional teaching tool, not just computer. The Kulik, Cohen, and Ebeling (1980a) programmed instruction meta-analysis found: "One third of these studies reported a medium or large effect in favor of PI; nearly two-thirds of the studies found small or trivial effects, and very few studies reported moderate or large effects in favor of conventional instruction" (p. 58).

Clark (1985) argued that construct validity is an issue when evaluating CBI effectiveness studies. Bunderson and Christensen (1995), researching a computer science program at Brigham Young University, found another potential validity issue when they discovered inadequate computer experience was one of the contributing explanations for less than desired enrollment and attrition figures for female students. These concerns could have a bearing on the varying results in computer effectiveness, where reported contradictions might be attributable to learner prerequisite skill and attitude. Using 40 studies from the Kulik, Kulik, and Cohen (1980b) meta-analysis of computer-based college teaching, Clark (1985)

concluded the following: 75 percent of the studies had serious design flaws, including failure to control the amount of instruction time and failure to control instructional method. In reference to the issue of whether CBI is more effective than traditional teaching methods, Clark wrote, "There seems to be ample evidence in existing studies that no theoretical reason exists to ask such a question" (p. 259).

Jacobson and Spiro (1995), however, indicated where research should be directed: "We currently have poor theoretical and research perspectives from which to understand special characteristics associated with learning in nonlinear and multidimensional hypertext instructional systems" (p. 301). Feedback is one of the special characteristics associated with CBI, a characteristic that has been studied for decades with varying degrees of success. Feedback in nonlinear and multidimensional hypertext is particularly unique, in that instructional feedback in such a system often has to be independent of previous explanations and covered content. Kulik and Kulik (1988) provided specific recommendations for research of feedback:

A number of the applied studies have been criticized for their lack of experimental control. Reviewers have suggested that factors other than feedback timing may have produced the effects observed in some of the experiments. For example, students who receive feedback through answer-until-correct tests not only receive feedback sooner than other students, but they also receive feedback on more responses. Each time a student answers a question incorrectly, the student is required to answer the question again, and the student receives feedback on the new answer. In addition, in some evaluations of answer-until-correct tests, students in the immediate feedback group receive feedback both during the original testing session and then again when test answers are reviewed with the whole class a few days later.

These methodological criticisms may not be important from a practical point of view. As long as teachers arrange feedback conditions

as they were arranged in these studies, they can expect results similar to those in the studies. But from the point of view of learning theory, the criticisms are more troubling. Clearly, experiments that provide better control on extraneous variables are needed to fill out our understanding of effects of feedback timing on human learning. (p. 93)

Dempsey, Litchfield, and Driscoll (1993) examined feedback, retention, discrimination error, and feedback study time. They criticized existing literature because researchers rarely monitored the number of error responses made during instructional treatment (although existing CBI authoring systems would allow monitoring). Dempsey et al. stated that more delayed posttests were needed to determine the extent to which feedback reduces forgetting. They were also critical of attempts to generalize research findings to any learning situation. Yet Kulik and Kulik (1988) argued that this urge for generalization may not be a weakness:

Applied studies are usually high in external validity; if internally valid, their results can be generalized easily because the studies are carried out in real teaching situations. Laboratory experiments, on the other hand, tend to be high in internal validity; extraneous variables are usually carefully controlled in such experiments. (p. 93)

Most of the research studies used for this literature review were applied in nature.

Referencing the Kulik and Kulik (1988) study, Dempsey et al. (1993) criticized existing literature for a focus on feedback related to testing, instead of instruction (p. 304). This criticism could be leveled at many of the studies selected for this literature review, where animation, hypertext presentation, orienting activities and locus of control variables are related to testing, rather than instruction. However, in many CBI programs, a distinction between these two

conditions could be quite blurred. Markle (1990) differentiated between programmed content (presented content that is taught through the use of experiential or inquiry learning which forces the learner to use high order thinking skills), response requests (interactive questions which require the students to respond actively and overtly, through efficient response mechanisms, over presented content, sometimes based on a system called "RULEG," followed by feedback appropriate to the response accuracy), practice items (used to build skill), and testing (used to evaluate skill). Yet, response requests can be used to convey content, practice items can be response requests, and all presented content is not necessarily "programmed." Distinctions between such descriptive labels are not well defined in theory nor clear in all instructional environments.

The value of theory and research for designing effective instruction is well documented. However, few designers who are responsible for design are trained for such a task, they are more often subject matter experts. In 1986, Hannafin, Phillips, and Tripp wrote, "The rationale for design of interactive video lessons appears to have evolved largely through intuitive beliefs paired with the trial and error experiences of designers. Many of the tacit assumptions regarding effectiveness have little or no empirical foundation" (p. 134). More than a decade later, research appears to be in a similar predicament:

The ambition of ID [instructional design] models is to support the design of efficient and effective instruction. This goal can only be reached if they are readily used and appropriately applied. In other words, in the absence of a recognition of the value of design in general and ID models in particular by potential users, these models remain theoretical constructs no matter how practical they might be. However, it seems that in the context of authoring multimedia and hypermedia systems, ID models are hardly used and,

when they are, they are regularly misapplied. The chain between theory and practice seems to be broken. (Gros et al., 1997, p. 49)

CAI Literature Overview

In her text for instructional design graduate students, Designs for Instructional Designers, Markle (1990) encouraged more investigation of research literature prior to instructional design. Gros et al. (1997), not only encouraged this exploration, they defined the purpose behind reviewing existing literature and formulating instructional design (ID) models:

In order to solve instructional problems, ID models make explicit which variables to consider, specify their interrelationships, and provide indications on the use of particular instructional interventions. By doing so, ID models aim at bridging the gap between theory and the development of powerful learning environments. As such, ID models are neither purely theoretical nor purely practical; they are bridges between both extremes. (p. 48)

A great deal of work is available regarding evaluation and/or development of CAI and CBI programs (Bork & Pomicter, 1990; Bourne, McMaster, Rieger, & Campbell, 1998; DeBloois, 1984; DeJoy & Mills, 1989; Dempsey, 1986; Flouris, 1989; Gagne, Wager, & Rojas, 1981; Greene et al., 1994; Gros et al., 1997; Gros & Spector, 1994; Landow, 1992; Lennon & Maurer, 1994; Markle, 1990; Martin & Bramble, 1996; Overbaugh, 1994; Pritchard, Micceri, & Barrett, 1989; Rossett & Barnett, 1996). Ranging from theoretical, based on intuition, to theoretical, based on empirical evidence, this body of writings can be used to synthesize a theoretical framework for CAI, while systematically evaluating that framework for effect.

Utilizing theory and empirical research to develop CMC systems is important, so that efficacy and efficiency can be maximized. Derycke (1991) wrote:

Computer-mediated communication can have a central place in the development of the open learning hypermedium, offering different dimensions to favor further education or lifelong learning. However, in spite of the social values of CMC, it is important to assign a pedagogical role to these tools. For this aim, it is necessary to carry out a lot of field research and experiments. The design of new systems must take into account new foundations for design, or new paradigms. (p. 222)

Greene et al. (1994) studied 66 college students who were exposed to two reading speed programs, to test the effects of "chunking" treatments at different reading speeds. The programs forced students to read at 350 or 500 words per minute (wpm). The material was either randomly segmented or segmented into meaningful chunks. Comprehension was better when the content was segmented into meaningful chunks, especially for students at 500 wpm, although the effects were not strong. Markle (1990) pointed out that to some degree, the computer itself limits the size of a chunk, simply by how much content fits on a screen. Indeed, a casual survey of students interacting with hypertext mediums reveals students often prefer to print out hypermedia to avoid the confines of the computer screen and the necessity for scrolling. However, some hypertext programs do not allow for printing and/or increasing the size of chunks. Porter (1998) defined chunking with this explanation: "A chunk, or the smallest piece of information that makes sense by itself, is a manageable amount of information. It might be an icon or a symbol, a paragraph, a menu, a photograph – whatever has independent meaning" (p. 129).

Martin and Bramble (1996) wrote, "The educational characteristics of successful distance education courses and programs can be broken into three broad and sometimes overlapping categories: instructional considerations, management of the instruction, and personnel" (p. 86). These researchers described the need for clearly defined objectives, meaningful interaction, practice, immediate feedback, orienting activities such as advance organizers, quick pacing, structured notes or outlines of content, a variety of media utilized in presenting content, identification of prerequisites, personalizing instruction, and providing for equipment failure, among other concepts. The project designed by Martin and Bramble provided five courses over distance education equipment in Florida, as a collaborative effort between the University of Central Florida, area community colleges, and armed forces schools. Built on a framework for distance education using empirical research and theory, a program emerged that helped "students master the learning objectives" and "both students and instructional personnel rated the learning methods, interactivity, and other course characteristics generally effective" (p. 97).

Pritchard et al. (1989) examined 213 computer-based training (CBT) packages over a 12-month period. These packages were compared to a courseware evaluation flow chart providing the most comprehensive evaluation tool located throughout the materials examined for this literature review. While their study is nearly ten years old, the results are likely to be quite similar if the study was replicated today (Gros et al., 1997). The following results are of particular significance to this literature review: only 5.63 percent of CBT

packages indicated they completed a task analysis; more than one third did not have stated objectives; over half stated objectives, but did not measure accomplishment of those objectives; the courses tended to imitate course content and presentation methods used in more traditional instructional methods; and, instruction that involves the learner in higher-level cognitive processes was rarely used (p. 19). While 94.3 percent of the 213 courses used feedback, less than half used positive feedback more than half the time. The authors underscored an area needing more research:

Very shallow interactivity was indicated by the fact that the learner was able to respond to continuation prompts with single key strokes in 82.2 percent (175) of the courses significantly or extensively. This technique, although convenient for the learner and easy for the developer, does not stimulate the learner to think deeply about the material, and can lead to absent-minded "page turning." (p. 19)

Pritchard et al. (1989) also found that over one-third of the packages failed to use response requests, which "indicates a very low level of interactivity during these lessons and displays a fundamental weakness in the design of these CBT lessons" (p. 20). A disturbing reference to higher level cognitive skills suggested by the authors referred to multiple-choice, true/false, and simple matching exercises as requiring only low-level skills. However, Markle (1990) contradicted that implication, as would most educators familiar with the RULEG (Evans, Homme, & Glaser, 1962) system for building interactive instruction. A deeper probe might reveal that more of these packages used higher-order cognitive skills embedded in, for example, multiple-choice questions than Pritchard et al. (1989) reported. Also, Pritchard et al. stated, "The ability of the learner to control a lesson's sequence and timing is critical" (p. 20), while existing empirical

research presents conflicting reports on the issue of pacing and sequencing.

However, Porter (1998) offered a potential explanation for the significance of sequencing and pacing:

Although they may skip from section to section, reading the last chapter before the first, most people employ a linear approach to reading a document, reading from the front cover to the back. However, users approach electronic, hyperlinked information very differently. They seldom read paragraph after paragraph and scroll through screen after screen of text and/or graphics. Instead, they prefer to scan a screen to find the bits of information that are most important to them. If the information takes too long to read, if the first screen lacks the information they want, or if the screen design doesn't capture their attention and make them want to investigate the site further, they simply move to another site. (pp. 128-129)

Porter's words indicate a potentially serious problem in online instruction, that of reader inattention or impatience. When conceptual hierarchies are necessary for concept formation, when sequencing is imperative to mastery, the behavior Porter describes could interfere with learning. Further research is necessary to explore learner behavior while interacting with online instruction.

Of critical interest to this study, Pritchard et al. (1989) concluded, "Publishers need to recognize that the simple transfer of traditional instruction to the dynamic medium of the computer, perhaps with the addition of a few 'bells and whistles' to maintain student interest, does not necessarily imply improved learning" (pp. 21-22).

DeJoy and Mills (1989) examined opportunities for adult learners to pursue individual interests in a self-study program in Georgia. The program allowed learners to provide feedback concerning their experience with the tutorial materials and the authors of this study used that feedback to construct criteria for evaluating interactive programming. DeJoy and Mills addressed technical

requirements for well-received and effective instructional design. They reported users wanted the following: clear directions, stated behavioral objectives, materials that are free of errors, access to appropriate help, protection against unauthorized use and for privacy, ability to adjust level of difficulty, pacing and sequence, and ability to enter and exit the program at any time and place in the sequence.

Flouris (1989) provided a flow chart that depicts an instructional design model for effective CAI programming. He claimed the model goes beyond a behaviorist paradigm for instruction and incorporates a cognitivist approach. The flow chart system has been modified for use with this study to describe the instructional design matrix used. The modifications are based on research located for this literature review, which contradict some of the proposed components suggested by Flouris. For instance, Flouris included this direction in his flow chart: "If learner(s) did not attain lesson's objectives, present new version of same lesson and reassess" (p. 18). However, as research dealing with KCR or "knowledge-of-correct-response" indicates (see "Interactivity" in this literature review), elaborative feedback is not necessarily useful in learning, and simple knowledge-of-correct-response serves quite well to help learners forget the wrong response and recall the correct response on posttests.

Overbaugh (1994) wrote, "Many instructional design theories and related computer-based empirical research findings are merged into a prescription for the most important facet of courseware development -- instructional design" (p. 29). Following recommendations from research on teaching strategies, student

performance, and unique computer-based characteristics, Overbaugh sought to provide a prescription for courseware development by subject matter experts. Under the domain of "instructional set," he encouraged gaining attention, providing orienting activities, and assessing prerequisites. Under the domain of teaching strategies, Overbaugh recommended developing content that is related to objectives and free of unnecessary information -- Markle (1990) called this "lean content" -- providing meaningful chunks, presenting the content in clear and meaningful ways, and using design characteristics to enhance understanding and minimize distractions.

Effective teaching strategy requires consideration of preferred learning technique -- should students engage in elaboration, discovery learning, or inquiry learning? Overbaugh (1994) clarified: "Elaboration strategies require the student to do the least cognitive processing and discovery learning strategies require the most" (p. 35). Inquiry learning -- what Markle (1990) encouraged in her text on programmed instruction -- falls somewhere between elaboration and discovery learning. Following the principles of RULEG (Evans et al., 1962; Markle, 1990), Overbaugh (1994) defined inquiry learning as a technique where "one poses a rule or question and then guides the student to discover evidence to support or disprove the rule or discover an answer to the question (as opposed to discovery learning, in which no rule is stated initially)" (p. 35). Overbaugh also suggested the cautious use of "counterexamples" -- other researchers have called these "nonexamples" -- to aid in concept formation. To his credit, Overbaugh examined the area of learning transfer, an often neglected form of instructional assessment:

"Learning requires relevant practice; that is, a student must be able to remember and apply knowledge to the same or similar situations in the future, a skill generally accomplished through practice and elaboration" (p. 37). Overbaugh insisted on "varied practice" or practice that provides for a full range of examples (Markle, 1990, also suggested this practice). According to Overbaugh, review enhances retention and that review can be offered in a variety of ways, including review prior to acquisition, review following acquisition, and review prior to evaluation.

The student performance domain in Overbaugh's article relates to Markle's text on active, overt responding. While not necessary for learning, active and overt responses allow the instructor to evaluate student progress in learning. Leaning on scanty and inconclusive research, Overbaugh suggested "performance realism," where instructors develop concept learning under conditions that closely resemble the conditions under which students will be required to use the information (see also Ross, McCormick, Krisak, & Anand, 1985).

Beyond a theoretical overview of CAI, the following general topic areas reflect the research perspectives provided in the literature reviewed for this case study:

- Preparatory functions (includes functions which must occur before instruction begins, such as conducting a task analysis).
- Teaching tactics (includes tactics that enhance the learning process, such as establishing cooperative learning opportunities).

- Content maneuvers (includes all maneuvers that establish required content, such as providing an adequate range of examples to promote concept formation).
- Presentation logistics (includes logistics that enhance content and learning, such as reducing load on memory to a necessary minimum by “chunking” material appropriately).
- Interactive strategies (includes strategies that elicit a response from the learner, such as requiring active, overt and efficient interactivity).

Preparatory Functions

Markle (1990) advanced these questions regarding preparatory functions:

- Is there a recognizable instructional need?
- Has a task analysis been conducted and is it included with the instructional materials?
- Are clear instructional objectives provided with instructional materials?
- If provided, are the objectives matched to the task analysis and instructional need?
- Is there a match between the objectives and the criterion tests used to measure them?
- Are potential learner objectives sought and accounted for in the instructional objectives?

Using programmed instruction throughout, her text serves as a model for how a textbook can utilize interactive instruction, as well as sound instructional design.

An analysis of many adult-learner texts and CBI systems reveals that often no task analysis has been conducted; objectives, if provided, are often written in terms that are not easily measured; and some content fails to relate to the stated objectives.

While rarely mentioned in the research reviewed, the case for behavioral objectives was well made by Mager (1984) in Preparing Instructional Objectives, first published in the early 1960s, and the concept has been adopted by instructional designers ever since. Indeed, Markle (1990) emphasized the importance of well-written objectives in her text, and Rothwell and Kazanas (1992) did the same. Rothwell and Kazanas developed a useful chart of behavioral terminology for well-written objectives (see Table 2). However, instructional designers should read the Markle (1990) text, to understand how most of the test item types Rothwell and Kazanas discussed could be written to provoke a lower or higher level of cognitive activity.

Also of concern is the issue of learner objectives. What does the learner want or need to gain from the course and has the course been designed to accommodate learner objectives? When students have objectives that are not met in a course, satisfaction with the professor, the program, perhaps even the college may suffer (Bunderson & Christensen, 1995). Learner objectives may suggest the need for individualization of content delivery or of content itself. Selection of remedial courses may be possible, but such courses also have need for accommodating learner objectives. Learner objectives could be accounted for by conducting a pretest and then modifying the course to suit the needs of

Table 2

Behavioral Descriptors for Objectives

Test Item	Brief description	Behavior
Essay	Requires learner to respond in essay format; appropriate to assess higher level of cognition (e.g., analysis, synthesis, and evaluation).	Construct Define Develop Discuss Generate Locate Solve State
Fill-in-the-blank	Requires learner to fill in the blank with a word or phrase; scoring tends to be objective.	Construct Define Identify Locate Solve State
Multiple-choice	Requires learner to choose between alternatives. Considered highly objective.	Discriminate Identify Locate Select Solve
True/false	Much like multiple choice, but less versatile.	Discriminate Locate Select Solve

Matching	Requires learners to match up items in one column with items in another.	Discriminate Locate Select
Project	Requires learners to demonstrate learning by performing a task or participation in an instructional experience.	Construct Develop Generate Locate Solve

Note. Adapted from Mastering the Instructional Design Process (pp. 151-152), by W. J. Rothwell and H. C. Kazanas, 1992, San Francisco: Jossey-Bass. Copyright 1992 by Jossey-Bass Publishers.

learners. While rare, such pretesting does occur, but whether the information is used as an accommodation is unclear. Sfondilias and Siegel (1990) used a pretest when they studied 152 students in an algebra class to determine the effectiveness of discovery learning and corrective feedback. The study was conducted over a period of three days and the purpose of the pretest appears to have been establishing a baseline of knowledge, rather than to establish learner objectives.

Bradley (1994) used a pretest when studying the use of CD-i technology to train dryer operators to properly monitor grain bin drying equipment, but the pretest was used only to establish effectiveness of the CD-i technology in comparison to traditional instruction methods. Ester (1994-95), getting much closer to learner accommodation, pretested 60 undergraduate music students using the Gregoric Style Delineator to establish learning styles. The study wasn't modified to suit these learning styles; Ester was researching the impact of CAI and lecture on learning styles. He concluded, "Abstract learners demonstrated significantly higher achievement with the lecture approach, while concrete learners performed equally well with the lecture and CAI instruction" (p. 129). In fact, none of the studies examined demonstrated a clear connection between learner objectives (gathered through pretesting) to the development of the instructional intervention. This could be a contributing factor in the study of efficiency. If it is inefficient for a student to study when continued study will not positively impact exam performance, it certainly would be inefficient to cover

content students have already mastered (Wesley et al., 1985; Grabe et al., 1990).

Grabe et al. (1990) studied college students who were given an option for computer assisted study guides to prepare for course examinations. The authors wrote:

For study behavior to be efficient and effective, students must be able to perform important regulatory functions. It is not efficient to continue studying material that has already been mastered, nor is it effective to cease studying when understanding has not been achieved and retention is not highly probable. (p. 113)

The authors discovered that while the computer program tracked student behavior and that information could be used to predict exam performance, students were not inclined to use the computer for such predictions. The authors suggested that the computer program should direct study behavior, based on the answers provided by students, rather than leaving those decisions to students. As Merriam (1988) stated, a theoretical contradiction exists in regards to adult learners and their abilities to self-pace or control their study behavior:

Much of the literature in adult education, for example, states that adults are self-directed and therefore can participate in planning, implementing, and evaluating their own learning. However, studies of adult learners have revealed that some do not know how to take control of their own learning. Since these two notions are theoretically inconsistent, a conceptual problem arises. (pp. 41-42)

Determining learner objectives and then accommodating those objectives demands adequate instructor preparation. Are instructors adequately prepared to meet these demands? How are instructors prepared and how do they prepare themselves to meet these demands? Wolcott (1991) conducted a qualitative study of professors preparing for distance education delivery. She wrote,

"Distance instruction differs contextually from traditional classroom instruction. Mediating instruction via telecommunications technology to overcome physical distance alters both the interpersonal and instructional communications processes" (p. 958). She argued that guidance for teaching at a distance was scanty and that practitioners were responsible for reflection of their own practice and planning for unusual demands. Wolcott examined the preparation of eleven full-time university faculty members teaching credit courses and discovered that "preactive" planning (planning that occurs outside and before interaction with students) was driven by content and focused on the development of an extended syllabus:

To these distance teachers planning instruction meant planning content. Participants centered on the selection and sequencing of the subject matter. In both the decisions they made and in the planning documents they produced, the faculty focused on content . . . While a few participants mentioned considering factors such as the characteristics of their audience, or the influence of logistical and technical constraints on instruction, it was a preoccupation with what to teach that drove the instructional design of the course. (p. 965)

Apparently what to teach was determined not by needs established by the audience, but on needs established by the instructor, making no accommodations for prerequisite skill, learner preparation, or learner objectives.

Instructor preparation also becomes imperative when other teaching methodologies are inherent in the environment, such as group interaction or cooperative learning. McCombs (1985) studied the theoretical foundations for incorporating instructor and group activities into a CBT program. She wrote, "In a study of factors critical to the success of self-paced methods . . . two of the factors consistently related to successfully implemented self-paced courses were

adequate opportunities for student/instructor interactions and the incorporation of group activities within individualized training" (p. 159). Her literature review revealed that the percentage of time instructors spent in "theoretically ideal roles" was influenced by years of experience, positive attitude, and their perception of the number of instructional and management problems in providing CBT instruction. The conclusion was that teacher training should focus on two key areas: teaching how to achieve functional skills in "theoretically ideal roles" and developing the instructor's ability to evaluate an instructional system to determine which roles should be emphasized in specific circumstances. Thus, McCombs suggested that instructors need to develop a high level of concept understanding and critical analysis skills.

McCombs did not address the issue of learner objectives or learner preparation. If group processing is a desirable component for CBI, shouldn't students be adequately prepared to function in a group model? Making the assumption that all students are equally prepared for group interaction is not theoretically sound. Indeed, in this dissertation study, part of the subject matter is dedicated to teaching students how to interact in small and task-oriented groups, to explore their interpersonal communication skills, and to develop skill-building strategies to improve group interaction (Pearson & Nelson, 1997).

Preparation of instructors, particularly in the area of preactive planning described by Wolcott (1991), refers directly to the efficiency of instruction. Crosbie and Kelley (1993) studied 51 students in an applied behavior analysis college course to demonstrate the use of a personalized system of instruction

and CAI. The authors described a personalized system of instruction following these guidelines:

. . . clear study objectives are provided; material to be learned is divided into small units; material is presented in a written format, students proceed at their own pace, each unit must be mastered before a student can proceed, immediate feedback is provided on each unit test, and proctors control testing and course administration. (p. 366)

Crosbie and Kelley altered the personalized system of instruction to allow a computer to take on some of the more burdensome course management tasks: "The result is an efficient course in which staff numbers, cost, paperwork, and administrative time are kept to a minimum" (p. 367). That efficiency is an important consideration when planning to utilize CAI, as long as efficacy is not part of the cost for efficiency gains.

Efficiency issues are also affected by preparation of other members of the higher education institution. While research tends to focus on instructors and learners as though they were the only players in the educational environment, others are inherently involved and that involvement is perhaps more pronounced with online technology. Shoemaker (1998) addressed these concerns with this advice:

As leaders in institutions of higher education are reviewing their missions...they may feel the need to rethink or re-engineer some processes to incorporate the benefits of technology in providing education and services to students in the Information Age . . . The administrative management structure has to be set up for the programs, including: registration, records, fees and billing procedures, textbook ordering, and national marketing. . . There needs to be a Faculty Coaching Group that works with the faculty to support translating the course content to distance education. . . A Media Production Group is needed with more people needed for web and multimedia production. . . A Research and Development Task Force or small group is needed for updating of equipment and uses of new technology. (pp. 141-148)

Teaching Tactics

Beyond learner objectives and preparation of education providers, learner preparation is an important issue. Markle (1990) lists the following areas relating to student skill and behavior:

- Are all necessary prerequisites stated?
- If stated, are prerequisites actually necessary to process the instructional materials?
- If not stated, what prerequisites are necessary?
- If visuals are utilized to convey meaning, are skills needed to interpret these visuals a part of the learner's repertoire?

Three studies reviewed for this dissertation covered the concept of prerequisites. Bunderson and Christensen (1995) concluded that prerequisite skill was a major factor in the lack of retention for female students in an applied computer science program; Gau and Madison (1993) used student experience with productivity software to guide the development of curriculum; and Ross et al. (1985) discovered that student achievement and attitude increased when they received CAI instruction presented in terms common to their background and interests. Empirical evidence demonstrates that attention to prerequisite skill and accommodation for that skill is important for the efficacy and efficiency of instruction. Overbaugh (1994) wrote, "Students rarely enter a learning situation with the same amount and type of knowledge. This problem can be compounded when developers of computer-based courseware try to create effective instruction for audiences whose needs can only be estimated" (p. 33).

Cordell (1991) studied learning style interaction with both linear and branching formats of CAI. "A two-way analysis of variance was performed on the data. The results showed significant main effects for instructional design, no main effects for learning style and no effects for interaction of instructional design and learning style" (p. 175). Cordell critically assessed her research findings and posited an interesting conclusion, "While learning styles are believed to be stable traits, it is possible that learning styles are flexible rather than static attributes and may change over time or in relation to a specific task" (p. 179). As Cordell recommended, this topic needs more exploration, and findings from that exploration could have an impact on theories for instructional design based on learner style. If sound, her suggestion could also relate to new directions in building prerequisite skills (i.e., developing a learning style to match the course as designed, rather than designing the course to match learning style).

Accommodating prerequisites and learner skills can occur in a variety of ways, but care must be taken in developing curriculum: "While theoretically and experimentally valid, designing instructional systems based on (aptitude) research may result in systems which are impractical because of their complexity" (Belland, Taylor, Canelos, Dwyer, & Baker, 1985, p. 185). Belland et al. discovered that self-pacing in CBI was not necessarily valid theoretically: "The present study demonstrated that during a self-paced instructional program subjects performed more poorly, in terms of amount learned and performance competency, than subjects in a moderately externally paced instructional program condition" (p. 196). In addition to their evaluation of pacing, the authors

inadvertently made an excellent argument for pretesting to establish prerequisite skill:

To determine the base rate of the subjects' preinstructional knowledge of heart physiology, a control group was randomly formed from the pool of 100 subjects participating in the study. The control group took the five tests but received no instruction. The control group method was used, as opposed to a pretest for all subjects, because it was felt that a pretest would serve as an advance organizer and therefore add an unwanted intervening variable to the study. (pp. 191-192)

Perhaps advance organizers through pretesting serve as an intervening variable and influence achievement results in empirical research, but such a result in application could be desirable. However, Kelly and O'Donnell (1994) concluded that students do not necessarily use pretests as advance organizers, so the assumption may not be sound. This concept deserves further research.

Pretesting could also be used to address another problem. Hypothetically, when students are not aware of their own competence with subject matter, they may engage in inefficient study behavior or procrastinate study behavior to avoid aversive study conditions. Reiser (1984) studied a personalized system of instruction (PSI) using three pacing procedures. He found no difference on withdrawal rate across groups. Reiser found a positive effect on rate of progress in the course when students encountered penalties for not meeting deadlines, but also found that student grade point average had a strong correlation to the rate of progress through the course. Final exam performance did not appear to be attributable to pacing treatments, but grade point average did interact with final exam performance. He concluded, "This study indicates that student procrastination in PSI courses can be reduced by presenting students with a

spacing schedule and penalizing them for failing to maintain that schedule. The data provide evidence that these results can be obtained without adversely affecting student attitude or final examination performance" (p. 46).

Hannafin et al. (1986) studied 80 volunteer college students in a variety of education courses. They were interested in the effects of orienting, processing and practicing activities on learning from interactive video. The content area covered art periods and artists. The authors concluded, "The findings suggest that practice remains a dominant influence. The effects of practice are most pronounced for factual learning, but effects related to adjunct learning activities were also found" (p. 137). Practice was defined by the authors as interactive options embedded in the CAI system, and practice alone had the most profound effect on learning. But the authors also examined accessing activities and defined those as the time needed to process information, "Learners often require time during lessons to process instruction. The issue of how much time is required to process instruction, and the nature of the opportunity to process instruction, warrant further study" (p. 134). Orienting activities include advance organizers, pre-questions, and statements of performance expectations. The authors explained:

Considerable evidence exists suggesting that the availability of orienting information affects both the amount and type of learning. The application of orienting activities, however, has met with mixed success when applied to interactive video -- especially in the presence of more powerful and pervasive lesson features such as practice. (p. 134)

Following their study, the authors concluded that orienting activities were ineffective in the presence of well-designed instruction. Access time, one of the

characteristics of CMC, was also ineffective; as the authors stated, "Quicker is not necessarily better" (p. 137). The authors suggested embedded practice and processing time, with further research to establish the upper and lower limits. Hannafin et al. found that performance was enhanced and was "consistently highest for practiced items under guided processing and shorter processing time" (p. 137).

In another personalized university course, Glick and Semb (1978) studied instructor-set pacing contingencies with 166 students in four sections of introductory child development. One group was required to finish the course in the traditionally prescribed time limit (one semester), while another group was allowed to finish the course over four semesters. The difference in completion frequency was similar across groups and there was no statistically significant difference in the mean academic performance of students who completed the course across groups. However, students in the four-semester group who took more than one semester to finish the course (some did finish in one semester), scored lower on academic performance tests than students who were in the one-semester group. The results suggest that taking longer than one semester to complete the course adversely affected course performance, but not completion frequency. The authors also claimed, "It seems apparent that deadlines set and enforced by the instructor prompted responding from students who otherwise would have postponed work" (p. 137). Related to student skill and prerequisites, the authors wrote, "Many students probably do not possess the skills required to

establish a work schedule that will allow them to complete a large task (course) within a specified length of time without extensive supervision" (p. 137).

Wesley et al. (1985) concluded, "The external control inherent in tutorial CAI did not enhance achievement . . . of students more than PI in a text mode. Both methods of instruction were equally effective." They also concluded that externally controlled and internally controlled students gained no specific benefit from either method of instructional delivery. But they suggest when computer literacy is considered as the dependent variable, externally controlled students benefited more than internally controlled students with CAI treatment.

Scardamalia, Bereitter, McLean, Swallow, and Woodruff (1989) studied intentional learning environments by conducting a literature review. They established these twelve principles based on current research for CAI environments supporting "intentional" learning:

1. Make knowledge-construction activities overt.
2. Maintain attention to student-oriented goals.
3. Treat knowledge lacks in a positive manner (not as failure).
4. Provide process-relevant feedback.
5. Encourage learning strategies beyond basic rehearsal.
6. Encourage multiple passes through information.
7. Support varied ways for student to organize knowledge.
8. Encourage maximum use and examination of existing knowledge.
9. Provide opportunity for reflection.
10. Utilize different learning styles.

11. Facilitate transfer of knowledge across contexts.

12. Give students more responsibility for contributing to each other's learning.

Steinberg (1989) also conducted a literature review to establish guidelines for using learner control. Steinberg concluded, "Studies of learner control in the last decade support earlier findings that students who have little prior knowledge about a subject are likely to perform poorly under learner control" (p. 117). The author suggested, however, that ongoing research is revealing the possibility that shifting computer control to the learner as learning progresses is not only possible but advisable: "Students do not perform as well under learner control as under adaptive computer control" (p. 118). Steinberg stated:

Learner control of instruction is intuitively appealing. The argument is that students will be more motivated if allowed to be in control of their own learning. Learner control can alleviate boredom, frustration, and anxiety because it enables students to skip over materials which they are not prepared to study. Learner control will maintain attention longer, involve students more deeply, and perhaps give students greater insights . . . the expected benefits of learner control were not supported and that intuition was not substantiated. (p. 117)

However, instructors must decide if learner control, like computer literacy, is one of the learning objectives they want to foster in students. Perhaps giving students more control over the learning experience is desirable and worth slight decreases in performance levels or less efficiency. More research in the area of learner control seems indicated. As Scardamalia et al. (1989) stated:

For it is not the computer that should be doing the diagnosing, the goal-setting, and the planning, it is the student. The computer environment should not be providing the knowledge and intelligence to guide learning, it should be providing the facilitating structure and tools that enable students to make maximum use of their own intelligence and knowledge. That is the idea behind procedural facilitation. (p. 54)

Markle (1990) suggested that discrimination learning was an ideal learning strategy and should be encouraged through instructional design. Preferred learning skills would also include knowledge transfer, problem solving, and concept formation. Clearly, other researchers have encouraged these same considerations (Brothen, 1991; Casey, 1996; Culmer, 1997; Dempsey, 1986; Derycke, 1991; McCombs, 1985; Overbaugh, 1994; Sfondilias & Siegel, 1990). Beyond what has been examined in this literature review so far, several other research articles have conclusions to offer on learning strategies and skills.

Cooperative learning or the concept of community interaction was specifically explored by three studies beyond those already mentioned (Cuseo, 1996; Kelly & O'Donnell, 1994; Pugh, 1993). Pugh (1993) focused on the encouragement of dialectical thinking ("the ability to understand and reason from multiple viewpoints," p. 30) through CAI. She asserted that dialectical thinking is developed when students attempt to pool a range of information and perspectives by turning to collaboration. With the unique ability to access information across the globe, hypermedia environments have abundant opportunity for collaborative learning and dialectical thinking. As Culmer (1997) suggested, however, students may not often access that information in self-directed environments. Pugh wrote, "The final word on the success of technology, should not concern the technology itself but rather the outcomes in the course using the technology. There, the final section of this discussion looks at how students evaluated their experiences . . ." (p. 37). Pugh's students reported they had learned to treasure dialectical thinking and would use this

learning strategy in the future. Students reported that dialectical thinking, however, made issues appear more complicated than they had previously believed. These students also reported they found argument analysis artificial, but it might be useful in fostering an exchange of perspectives. All of these learning activities took place in CBI systems, demonstrating that students can gain practical experience in cooperative learning through this teaching methodology.

An interesting study by Kelly and O'Donnell (1994) sought to explore student review of lecture notes. The study established that when lecture notes were studied in dyads "strategies were more comprehensive than the individuals' and were more directed at extracting elaborative and hierarchically structured information" (p. 373). Dyads pursued more concepts in review and more range of information than students working alone with their lecture notes. The authors suggested computers could be utilized to guide study behavior, particularly for individuals: "For example, students could be advised about their study patterns by theme, concept, level of detail, and link type" (p. 385).

Cuseo's (1996) text on cooperative learning was recently circulated to all faculty members and administrators at a small liberal arts college in the Midwest. The rationale for this circulation was the need for understanding and effective implementation of cooperative learning at such an institution of higher education. Cuseo wrote about the efficacy of cooperative learning, based on empirical and applied research. He suggested cooperative learning can be superior to traditional instruction:

Possible explanations for the effectiveness of peer learning and teaching may be that peers are better able to explain certain concepts than the instructor because: (a) the peer teacher and learner are at closer stages of cognitive development, and (b) peers have more similar levels of experience with respect to the concept being learned. Also, the perceived similarity of the peer teacher by the peer learner may result in greater identification with the teacher, triggering better emulation of effective learning strategies modeled by the peer teacher. Such productive imitation of peer-modeled learning strategies would be especially useful for underprepared learners who may have yet to develop effective academic skills and learning strategies. (p. 4)

CAI allows for collaborative learning and identification with peers. Will CBI or online instruction, however, allow for that same level of identification when face-to-face interaction does not occur? This topic remains to be thoroughly explored by research.

Knowledge transfer was examined by Jacobson and Spiro (1995), as well as McNergney and Hinson (1985). Jacobson and Spiro (1995) summarized, "A central concern of this study was the investigation of theory-based design principles for a hypertext learning environment to provide instruction in a complex and ill-structured content area. There are several important implications of this research project for the design and use of hypertext systems in instructional settings" (p. 326). The authors suggested that nonlinear connections between themes in ill-structured content were superior to linear constructions (found most commonly in texts), although these hypertext links were predetermined by the program creators. They suggested future research to explore the value of "student-selected theme combinations and learner created themes" (p. 326). The authors also found that some students are ill-prepared to take advantage of the non-linear and multidimensional aspects of hypertext environments and

suggested further study to determine how to help these students gain prerequisite skill, which supported the findings reported by Cordell (1991). Landow (1992) also recommended non-linear presentation of instructional material and allowing for student-driven branching: "First, no one arrangement of information proves convenient for all who need that information. Second, although both linear and hierarchical arrangements provide information in some sort of order, that order does not always match the needs of individual users of that information" (pp. 18-19).

McNergney and Hinson (1985) studied a computer-based method for diagnosing supervisory decision making skills. While teaching to encourage knowledge transfer and concept formation is often the focus of studies pursuing learning strategies and skills, assessing these abilities is also at issue. Preactive or planning decisions were the focus of McNergney and Hinson's study. The ability to simulate decision-making situations and environments in the field is one of the superior aspects of CAI, according to these researchers:

This simulation could be constructed as a set of paper and pencil exercises, but there are some distinct advantages to making it computer-based. The computer can present problems and possible solutions not as a cafeteria from which supervisors may select, but more as they arise during the natural course of planning supervision under normal working conditions, that is, the solution to one problem may create a new problem with an entirely different set of possible responses. In addition, by making the simulation computer-based, it is possible to avoid problems of supervisors examining and reexamining all problems and all possible decisions and all relevant materials at will. Supervisors rarely have the freedom to attack and resolve supervisory problems this way, even at the planning stage. (p. 182)

McNergney and Hinson were suggesting that while one advantage of CBI is presentation of text in non-linear fashion (branching), another attribute could be

the potential for even tighter control on linear presentation. That is a contradiction which might be resolved by future research. The concept of knowledge transfer across contexts and situations is highly complicated and needs further enlightenment through carefully designed research.

Shank, Ross, Covalt, Terry, and Weiss (1994) wrote an article dealing with creative thinking skill improvement through the application of CAI to teach “abductive reasoning.” To define the concept of abductive reasoning, the authors offered these examples:

The surprising fact, C, is observed; but if A were true, C would be a matter of course; hence, there is reason to suspect that A is true. The following example can help illustrate the nature of the abductive syllogism in more concrete terms. (1) All the beans in this bag are white. This bean is from the bag. This bean is most certainly white [a deductive syllogism]. (2) This bean is from the bag. This bean is white. All the beans in this bag are probably white [an inductive syllogism]. (3) This bean is white. All the beans in this bag are white. This bean is possibly from the bag [an abductive syllogism]. (p. 35)

Shank et al. developed a CAI program to teach abductive reasoning. One of the key aspects of this particular study is the indication that several field tests with different learners, different instructors, and different learning situations were necessary to improve the program to a satisfactory level. In regards to teaching abductive reasoning, the authors wrote, “We believe it is important to address the topic of abductive reasoning within current instructional design programs. Abductive thinking can help foster and enrich creative and insightful reasoning” (p. 41). The contribution of the authors’ work, in developing the abductive reasoning program, provides more evidence that ill-structured domains and concept formation is possible utilizing computer technology.

Miller and Weaver (1976) utilized behavioral techniques to produce concept formation in university students. They followed theoretical guidelines for programmed instruction, applying that theory to construct a programmed text, much like the model developed by Markle (1990). Through three experimental treatments, the authors concluded, "A textbook incorporating concept programming produced a high score on a generalization test, that concept programming is a crucial component of that textbook, and the resulting generalization test score is greater than that produced by at least one comparable traditional textbook" (Miller & Weaver, 1976, p. 299). That theoretical framework is not necessary for CAI (or a textbook), but these findings suggest that producing one program or another without programmed content for concept formation would be less effective.

Content Maneuvers

Markle (1990) addressed the issue of content at great length. Oddly, little empirical research could be found to synthesize a theoretical framework for content maneuvers. However, Markle suggested the following theoretical limits for selecting content in programmed instruction:

- Are all objectives covered by content?
- Is all content directly related to stated objectives, task analysis, and instructional need?
- When tangential information is included, has relative importance been indicated?

- Is all content “programmed” (accompanied by response requests or practice items)?
- Has content been tested (empirical data from posttests or delayed testing) to determine if the information provided is sufficient to achieve mastery for performance at selected standards?
- Are examples (in content) different from those included in response requests and tests?
- Considering stated objectives, are provided examples adequately wide-ranging for thorough concept formation?
- Is the subject matter sound (i.e., will subject-matter experts agree on relevance and accuracy)?

Other than the ancillary concepts described earlier in this literature review (such as knowledge transfer) which would necessarily suggest some guidelines for content, the most applicable line of inquiry appears to be using computers as study guides in CAI. As Markle suggested, content maneuvers include providing examples and enough practice to foster content mastery. The topic of practice, particularly in CAI, has garnered attention in instructional design literature.

Grabe et al. (1989) researched the value of computer assisted study which provided multiple choice questions over textbook material and feedback which directed students to appropriate textbook sections for further study. Students in this treatment group outperformed students who studied on their own.

Hannafin et al. (1986) reported that practice was superior to orienting and processing time in study behavior, supporting the premise that CAI, with practice as its main function, would be beneficial in instruction.

Sawyer's (1988) study compared computerized and conventional study guides, finding that conventional study guides seemed to contribute to higher performance scores. Sawyer failed to control use of conventional study guides (some students in the computerized treatment group used the conventional study guides, thus some students may have spent more time at studying behavior than other students) and the research does not clearly indicate how the computerized version functioned. However, he clearly indicated confounding issues in the study (time constraints in using the computerized guides, lack of computer access, lack of computer literacy, and inefficiency in the computer program).

Kelly and O'Donnell (1994) used computer technology to research how students used lecture notes (individually and in dyads). Unlike instructor-developed study guides, the computer was used to determine how students directed their own study based on their lecture notes. The study replicated earlier findings that students do not learn well from their lecture notes, but learning from lecture was enhanced in study dyads.

Grabe (1988) studied online activities and how these could produce more effective learning. His literature review suggested electronic notebooks can be utilized effectively to help students "enter, organize, and manipulate information" from lecture and texts. He favored this tool in the formation of concept mapping. However, a decrease in efficiency may override benefits gained from such a tool

in specific circumstances (e.g., when the student does not own a personal computer or cannot afford the software, or when the educational institution does not provide adequate software in computer labs).

Presentation Logistics

Markle (1990) addressed design issues which remain scanty as topics in research. With rapid developments in computer technology, research will likely fail to keep up with the potential of CMC and will be unable to provide research-based guidelines for CMC design. But Markle has provided a few basic considerations:

- Does content presentation follow the principles of skillful writing and clear communication?
- Is meaning and significant information appropriately conveyed by design?
- Is content presented in a logical sequence? Is the sequence necessary or preferred?
- Has the load on memory been reduced to a necessary minimum by content, delivery technique, and response requests or practice items?
- As far as economically feasible, is everything a learner needs to deal with at one time immediately available?

Discussions about design in CMC cannot be complete without discussions about animation, the unique attribute of computer-based technology. Rieber, Boyce, and Assad (1990) studied the effects of animation on 141 university students in a Newtonian mechanics course. Students were divided into groups

receiving static graphics, animated graphics, and no graphics, crossed with three levels of behavioral (response requests), cognitive (simulation sequence), and no practice. Animation and static graphics had no effect on learning. Behavioral and cognitive practice both positively affected performance, but there was no significant difference between these two practice types.

Rieber (1996) studied the effect of text versus animation as feedback tools. Students interacted with the computer program utilizing discovery learning (no formal introduction of information). The results showed that students learned more tacit knowledge with animated feedback. However, Rieber cautioned, "The challenge to designers is considerable -- the learning environment must establish an effective partnership between the visual and verbal systems without overwhelming or distracting the user with multiple representations" (p. 20).

Rieber also noted that students became more frustrated as they interacted with verbal feedback than they did with animated feedback, perhaps because the graphical interface may have appeared to be more suited to the task, "A graphical interface seems like such a natural way to provide feedback in a simulation dealing with a physical science domain" (p. 20). Rieber concluded that the level of interactivity declined with the graphical interface, "Clearly, more interactivity with the simulation did not help in playing the game or answering the posttest questions" (p. 20).

Ok-choon Park (1994) studied dynamic visual display (DVD) technology in a literature review. Park's recommendations included adequate verbal explanation of dynamic features, careful adherence to factual display in

animation (to avoid faulty conclusions), and recognition of the processing time needed for verbal and visual information. Park's recommendations appear to coincide with Markle's (1990) advice that instructional designer's consider prerequisite skills when using visuals to communicate content.

A great deal of research has been conducted in typography, but generally for print media, not for computer-generated visuals. At the Society of Collegiate Journalists' 1998 national convention, W. J. Green (1998) offered his guidelines for typography on the WWW. His suggestions included body copy above 10 point, avoidance of blocked typefaces, avoidance of sans serif typefaces, extra tracking (what print typographers would call letterspacing), and an x-height (the height of the lowercase "x" in a typeface) of at least 8 pixels for 14-point type. These principles appear sound, but due to great variety in screen sizes and the current consumer preference for larger screens (e.g., a marriage between television and computer technologies), these typographical guidelines may be short-lived. Also, the Web page designer may have no or limited control over preferences set by the user at a distant terminal. Backgrounds, color selections, and typefaces can be set as user preferences, making traditional design considerations practically obsolete.

While Markle's (1990) text was written prior to the popularity of the WWW as an instructional delivery tool, the issues of design and presentation particular to Web-based instruction should not be overlooked. Markle suggested clarity of communication should be uppermost in the designer's planning strategies and that physical design must be manipulated to enhance content. Markle's

experience included working with the early teaching machines prompted by B. F. Skinner's theories of learning behavior. Markle discusses "chunking" in part to explore how to organize text, but also how to present text so that it fits on the available screen. When the size of the screen surface dictates "chunking," creativity in design becomes extremely difficult.

Bourne et al. (1998) investigated a variety of Internet-based courses and then listed the range of materials that may be presented in asynchronous educational systems:

- use of computer conferencing for submission of homework discussion of issues and help;
- on-line materials that include syllabus, assignments, reading, problems, and interactive learning modules;
- course management (homework submission, instant grading, and roll-ups of student progress);
- interaction with students via e-mail and listservs;
- audio clips of lectures (real-time audio and/or downloadable audio);
- video clips of lectures (real-time video and/or downloadable video). (p. 3)

However, the authors noted, "Review of most courses currently on the Web reveal that few offer most of these features. Indeed, more than a cursory look reveals that many courses on-line consist of little more than a syllabus and a list of assignments" (p. 5). Bourne et al. did not attempt to investigate how these materials are presented. Future study will likely reveal the optimal use of Web-

based technology in online course development, with empirically tested design guidelines.

Porter (1998) offers guidelines for design of distance learning on the Web, although her guidelines are not specific and may not be based on sound research:

Whether you're designing a home page or a linked Web page, each screen should stand alone, as well as support the design for the entire site. Limit the number of pages that have scrollable screens, so that users can see as much information as possible while they're looking at one screen. Keep in mind that your screens should reflect good electronic design principles, which often differ from good hardcopy design principles. Try to avoid a block arrangement of information, much as you would design pages of a book or a newsletter. Instead, incorporate three-dimensional graphics to keep your page from looking two-dimensional, or break up the placement of chunks to avoid a linear, square look to the screen. (p. 147)

Interactive Strategies

Most of Markle's (1990) theoretical framework was devoted to the construction of "response requests" (Markle's term for questions designed to elicit an active, overt response from the learner). Whether these are used for practice or programmed content, for pretests or posttests, response requests are, in the simplest terms, the stage for interactivity. Markle's guidelines include:

- Are response requests related to the objectives?
- Do response requests require active/overt responding?
- Are response requests efficient?
- Are correct responses (knowledge-of-correct-response or KCR) provided?
- Is feedback provided whenever feasible?

- Identify conceptual hierarchies -- do response requests require the learner to process the relations involved?
- Have response requests been tested (empirical data from posttests or delayed testing) to determine if the amount of practice provided is sufficient to achieve mastery for performance at selected standards?
- Do response requests require a higher level of cognitive involvement?

Evans et al. (1962) addressed the concept of RULEG in their research on programmed instruction. They explained the system whereby instruction is delivered in a series of rules and examples/non-examples. Well documented for efficacy (Markle, 1990; Overbaugh, 1994), RULEG and other examples of inquiry learning suggest that students gain concepts and knowledge transferability with this system. Evans et al. described RULEG where “ru [sic]” stands for rules and “eg” stands for examples or non-examples:

The invariant feature of all ru's is that they are all statements of some generality, from which substitution-instances are called eg's. An eg may also be a large number of things: a description of a physical event, a theorem or deduction of any sort, or a statement of relationship obtaining between specific objects, whether the objects are physical or conceptual. The invariant feature of all eg's is that they are all statements of some specificity, derived from more generalized ru's. The clearest instances of ru's and their corresponding eg's come from mathematics. (p. 513)

Ru's and eg's can be displayed in several configurations, with the underlying purpose of getting the learner to differentiate between examples and non-examples (sometimes referred to as fine discrimination and gross discrimination in the literature) in reference to a given rule. Ru's can be combined to form concepts. An important qualification for RULEG, however, is this quote from Evans et al., “The authors would like to dispel any impression that

they are irrevocably committed to a RULEG approach, or that they feel RULEG will solve all programming problems. The system contains a large number of gaps and guesses" (p. 518). Markle added that not all information can be divided into ru's and eg's:

Their term "ru" can be interpreted quite broadly, but it does not include all verbal material. You've told the learner something. Now you need to think: can the learner do something with an example? (Then you've told a ru to be applied in doing some procedure or classifying some cases.) Or, can the learner only state or paraphrase the verbal material? (Then it's not a ru, but information for storage in verbal memory.) (p. 171)

According to Markle, the cleanest formula for RULEG is to offer a rule and an example (RU + EG). The instructor might also need to offer a non-example (RU + EG + ~EG). Markle suggested, using the leanest formula possible, testing students to determine sufficiency ("lean"), and eliminating unnecessary information (eg's and non-eg's) which make instruction inefficient (p. 174). As Evans et al. (1962) stated, this is not a template which can be used in place of any other form of instruction, but RULEG can be quite useful in presenting rules for concept formation and RULEG can bring students to a higher level of cognitive involvement (beyond drill or rote memory).

Tudor and Bostow (1991) provided a study on computer-programmed instruction, comparing passive reading and covert responding to an interactive design. The results strongly favored active, overt responding, as suggested by Markle (1990). Kritch, Bostow, and Dedrick (1995) also studied active, overt responding and found it superior to passive, page-turning responding.

Feedback is a major area of research and such a vast array of studies are available they could not be exhausted for the purposes of this literature review.

A representative sample, however, was examined (Clariana, 1990; Crosbie & Kelley, 1994; Dempsey, Litchfield, & Driscoll, 1993; Gilman, 1969; Howard, 1987; Kulhavy, 1977; Kulhavy & Anderson, 1972; Kulhavy, White, Topp, Chan, & Adams, 1985; Kulik & Kulik, 1988; Noonan, 1984; Roper, 1977; Waldrop, Justen, & Adams, 1986).

Roper (1977) complained that “practitioners will be hard pressed to cite research that demonstrates the efficacy” (p. 43) of feedback in any form, obviously a condition that did not remain constant for the more than 20 years since Roper’s study was published. Roper pointed out that most feedback in CAI conditions will take one of five common forms: (1) no feedback; (2) KR (knowledge of response accuracy); (3) KCR (knowledge of accuracy plus the correct answer, if necessary); (4) KCR plus elaboration (why the correct answer is correct); and (5) KR plus interactive teaching, which may be accompanied by AUC (answer until the response is correct). Roper found that elaborative feedback was the most effective in correcting errors on posttests. Unlike most studies of feedback, Roper’s study examined constructed responses, not multiple choice tests.

Crosbie and Kelley (1994) launched a different approach to testing feedback in considering postfeedback delays in programmed instruction. Postfeedback delays are best demonstrated when the correct response appears in its entirety on the screen and the computer user cannot advance to the next question until the delay has been completed. The theory is that students will spend the delay time reading and processing the correct answer. When the

delay was 10 seconds, the effect was increased performance scores on posttests. The researchers recommended further study to establish optimal delay times (less or more than 10 seconds).

Dempsey, Litchfield, and Driscoll (1993) dealt with a similar topic, though not entirely comparative to the Crosbie and Kelley (1994) study, when they examined feedback and feedback study time and the impact these had on retention and discrimination error. Simply put, "Results indicated that the group receiving simple knowledge-of-correct-results feedback used significantly less feedback study time and was more efficient than in any other condition" (p. 303).

Kulik and Kulik (1988) conducted a meta-analysis of feedback timing.

Examining 53 studies on the issue, the authors concluded:

Delayed feedback appears superior to immediate feedback only when delayed feedback is presented in a complete trial, wholly separate from the acquisition trial. We conclude with Kulhavy (1977), therefore, that delayed feedback appears to help learning only in special experimental situations and that, more typically, to delay feedback is to hinder learning. (p. 94)

Howard (1987) attempted to develop a feedback decision-making model for distance educators. He pointed out that learners must demonstrate declarative (facts, etc.) and procedural (inferences, reflections, etc.) knowledge. He suggested carefully conducting task analyses for complex intellectual skills and demonstrated this behavior with a sample task analysis for essay writing. His concept is that a carefully constructed task analysis will help instructors develop more effective feedback. However, his essay-writing task-analysis model is too vague to be readily applied. He offered these four key

Table 3

Johari Window for Feedback Efficiency

		<u>Confidence Level</u>	
		High	Low
<u>Response</u> <u>Accuracy</u>	Correct	Feedback inefficiency could be critical; elaboration unnecessary	Immediate feedback is highly effective; elaboration may be useful
	Incorrect	Feedback processing time may be critical; elaboration could be necessary	Immediate feedback is highly effective; elaboration may be useful

occur because learners tend to process extra feedback information at a shallower level, since they do not perceive it as being directly related to the issue of identifying a correct response" (p. 290). Confidence level could prove to be a confounding variable in feedback complexity studies.

Noonan (1984) studied feedback with 90 students in a high school algebra course. Comparing six different approaches to feedback, Noonan's results showed the superior effectiveness of knowledge-of-correct-response (KCR), but also that knowledge-of-results (KR; e.g., "your response is incorrect") with a process explanation worked as well as KCR. Simple KR and asking the question again was the least effective feedback method. Noonan did not test to determine student confidence level in relation to response accuracy when applying treatments. Gilman's (1969) early research on feedback provided evidence that student performance improves when the reason for correctness in response is revealed (KR with elaboration), which appears to complement findings from at least some subsequent research.

Kulhavy (1977) provided an important research study, frequently referred to in later literature reviews. This study established that one of the weaknesses of a programmed text, in comparison to programmed computer systems, is the lack of control for presearch availability, arguably a point primarily during inquiry learning situations. Kulhavy may have been the pioneer in the quest for establishing a link between confidence level and feedback complexity. He is given credit for introducing the concept of a confidence factor in fine and gross discrimination errors. In contradiction, Markle's (1990) research suggested

discrimination errors are more likely a problem of generalization (undergeneralization in the case of gross discrimination errors) or misconception. She also maintained that discrimination errors were discouraged when sufficient examples and non-examples (the range of each) are provided in knowledge acquisition.

Kulhavy and Anderson (1972) concluded from their research findings that delayed feedback was effective when the content area was meaningful, touching on the issue of adequate processing time, but immediate feedback is more effective during discrimination learning. The authors wrote:

In laying a theoretical base for the experiment it was argued that delay of feedback on a difficult test will improve performance when the test is given again later because initial error responses will tend to be forgotten during the delay interval and, consequently, interfere less with learning of the correct responses from feedback. (p. 511)

They concluded that another consideration was an increase in study time in the delay of feedback treatment, which will add to concerns for efficiency. As long as increased study time leads to increased performance, efficiency requirements are satisfied. When a program, however, increases study time as a matter of course, without consideration for adaptation to student performance, efficiency will be sacrificed.

Presentation sequence based on performance, which is closely related in research to pacing, was handled informatively by Litchfield, Driscoll, and Dempsey (1990) and Dempsey (1986). In the 1986 article, Dempsey reviewed the "rational set generator," a computer software program to help instructors develop response requests with a variety of examples/non-examples and

immediate feedback. The issue of an adaptive approach, where efficiency of example/non-example presentation gains focus, arises from this early review. The Litchfield et al. (1990) study took up that challenge, where every potential response request is present (inclusive treatment) or where the number of response requests was determined by ongoing performance (adaptive treatment). The authors concluded, "Adaptive groups answered significantly fewer examples and needed significantly less time to complete the assignment while scoring approximately the same as other groups on the retention test" (p. 35). The adaptive groups answered 35 percent fewer questions, with a similar saving in time efficiency.

Synthesizing a Theoretical Framework for CAI

Overview. Utilizing recommendations gleaned from this literature review, a theoretical framework can be synthesized. This theoretical framework guided the development of the online course used for the current study. An interesting observation develops in such a synthesis and subsequent application to CAI: All of the theoretical framework does not realistically apply in all situations. In every situation, consideration must be given to existing hardware, software, host institution support, teacher preparation, student preparation, content, and the objectives of the program.

Preparatory functions. The preparatory functions from the studies examined for this literature review include all functions which must occur before instruction begins, specifically:

1. Identify the instructional need (Markle, 1990).
2. Conduct a task analysis (Markle, 1990).
3. Identify clear, written instructional objectives (Mager, 1984; Markle, 1990; Rothwell & Kazanas, 1992).
4. Match objectives to criterion tests used to measure accomplishment (Markle, 1990).
5. Account for and accommodate (when feasible) learner objectives (Bunderson & Christensen, 1995; Markle, 1990; Scardamalia et al., 1989).
6. Provide pretesting and/or advance organizers (Belland et al., 1985).
7. Prepare instructor(s) adequately to teach with selected methodologies (McCombs, 1985; Shoemaker, 1998; Wolcott, 1991).

Teaching tactics. The teaching tactics revealed throughout this literature review include all tactics that will potentially enhance the learning process, such as:

1. Identify all necessary prerequisites (Bunderson & Christensen, 1995; Overbaugh, 1994; Markle, 1990; Sfondilias & Siegel, 1990).
2. Encourage working in dyads where feasible (Kelly & O'Donnell, 1994).
3. Encourage cooperative learning in small groups where feasible (Bourne et al., 1998; Cuseo, 1996; Kelly & O'Donnell, 1994; Porter, 1998; Pugh, 1993; Scardamalia et al., 1989).
4. Where feasible, match instructional strategies to student skill and experience (Belland et al., 1985; Gau & Madison, 1993; Ross et al., 1985; Scardamalia et al., 1989).

5. Encourage a higher level of cognitive processing where feasible (Evans et al., 1962; Markle, 1990; Overbaugh, 1994; Pritchard et al., 1989; Scardamalia et al., 1989).
6. Encourage dialectical thinking where feasible (Pugh, 1993).
7. Encourage inductive, deductive, and abductive reasoning (Shank et al., 1994).
8. Utilize procedural facilitation where feasible (Grabe et al., 1990; Merriam, 1988; Scardamalia et al., 1989; Steinberg, 1989).
9. Encourage discrimination learning, concept formation, problem solving and knowledge transfer where feasible (Brothen, 1991; Casey, 1996; Culmer, 1997; Dempsey, 1986; Derycke, 1991; Jacobson & Spiro, 1995; McCombs, 1985; McNergney & Hinson, 1985; Miller & Weaver, 1976; Overbaugh, 1994; Scardamalia et al., 1989; Sfondilias & Siegel, 1990).

Content maneuvers. The content maneuvers examined in this literature review include all maneuvers that establish required content to achieve mastery or student performance at selected standards:

1. Cover all objectives with content (Markle, 1990).
2. Include content that is related to objectives, the task analysis, and/or the instructional need (Markle, 1990).
3. If tangential content is included, communicate relative importance of it (Markle, 1990; Overbaugh, 1994).
4. Use programmed instruction where feasible (Kulik et al., 1980a; Markle, 1990; Miller & Weaver, 1976).

5. Empirically test content to determine if the amount of information provided is sufficient to promote mastery for performance at selected standards (Markle, 1990).
6. Provide an adequate range of examples in content and practice items to promote concept formation (Markle, 1990).
7. Provide sound subject matter (Markle, 1990).
8. Adapt content to student skill and experience where feasible (Grabe et al., 1990; Wesley et al., 1985).

Presentation logistics. Presentation logistics revealed in this literature review include design elements and treatments that enhance content and learning, specifically:

1. Present content in necessary logical sequences (Markle, 1990).
2. When logical sequencing isn't required, present content and interactive exercises with non-linear connections where feasible (Cordell, 1991; Jacobson & Spiro, 1995; Landow, 1992; McNergney & Hinson, 1985).
3. Encourage non-linear investigation (student directed) where feasible (Cordell, 1991; Culmer, 1997; Jacobson & Spiro, 1995; McNergney & Hinson, 1985; Porter, 1998).
4. Follow the principles for skillful writing and clear communication (DeJoy & Mills, 1989; Markle, 1990).
5. Convey meaning of significant information through good design (Green, 1998; Markle, 1990; Porter, 1998).

6. Reduce load on memory to a necessary minimum by design and “chunk” material appropriately (Greene et al., 1994; Markle, 1990; Porter, 1998).
7. When using animation, keep to necessary and efficient visuals (Park, 1994; Rieber et al., 1990; Rieber, 1996; Sawyer, 1988).
8. Provide adequate support technicians and resources from host institution (DeJoy & Mills, 1989; Porter, 1998; Shoemaker, 1998).
9. Protect student privacy (DeJoy & Mills, 1989; Porter, 1998).
10. Protect program from unauthorized use (DeJoy & Mills, 1989; Porter, 1998).

Interactive strategies. The interactive strategies isolated in this literature review include strategies that elicit a response from the learner, such as:

1. Use response requests which relate directly to objectives (Markle, 1990; Pritchard et al., 1989).
2. Require interactivity (Pritchard et al., 1989; Sawyer, 1988).
3. Require interactivity that is overt and active (Kritch et al., 1995; Markle, 1990; Scardamalia et al., 1989; Tudor & Bostow, 1991).
4. Utilize moderate external pacing where feasible (Belland et al., 1985; Glick & Semb, 1978; Merriam, 1988; Reiser, 1984).
5. Maintain efficiency with interactivity (Grabe et al., 1990; Markle, 1990; McMinn & Foster, 1991; Wesley et al., 1985).
6. Empirically test interactivity to establish if practice provided is sufficient to achieve mastery for performance at selected standards (Hannafin et al., 1986; Markle, 1990; Overbaugh, 1994; Shank et al., 1994).
7. Provide feedback where feasible (Dempsey et al., 1993; Markle, 1990).

8. Provide correct responses and KCR where feasible (Clariana, 1990; Dempsey et al., 1993; Markle, 1990).
9. Provide elaborative, but efficient, feedback where feasible (Gilman, 1969; Kulhavy et al., 1985; Kulhavy, 1977; Markle, 1990; Noonan, 1984; Roper, 1977; Scardamalia et al., 1989; Waldrop et al., 1986).
10. Provide immediate feedback where possible (Hannafin et al., 1986; Howard, 1987; Kulik & Kulik, 1988; Martin & Bramble, 1996).
11. Provide positive feedback where possible (Pritchard et al., 1989; Scardamalia et al., 1989).
12. Present feedback with non-contingent, but efficient delay to encourage processing (Crosbie & Kelley, 1994; Howard, 1987).
13. Foster performance realism when possible (Overbaugh, 1994; Ross et al., 1985).
14. Provide performance reports when possible (Kiesler, 1991).
15. Record the number of error responses during interactivity to monitor and evaluate interactivity and communication (Dempsey et al., 1993).
16. Adapt number of response requests to student performance where feasible (Dempsey, 1986; Litchfield et al., 1990; Steinberg, 1989).
17. Encourage reflection with response requests (Scardamalia et al., 1989).
18. Encourage multiple passes through content with response requests (Scardamalia et al., 1989).
19. Identify conceptual hierarchies and use interactivity to require learners to process the relations involved (Markle, 1990).

20. Provide an adequate range of examples in response requests (and content) to encourage concept formation (Markle, 1990).
21. To promote efficiency, allow the computer to conduct administrative tasks (like providing feedback and scoring interactivity) wherever feasible (Crosbie & Kelley, 1993).
22. Maintain a higher level of cognitive processing with response requests, using RULEG (inquiry learning) where feasible (Evans et al., 1962; Markle, 1990).

Chapter 3

Method

This case study was conducted through naturalistic inquiry, rather than quantitative analysis, and was designed to explore these research questions:

- Can online (computer-assisted) college instruction, using theoretically sound instructional design, provide rich instructional interaction without sacrificing time efficiency?
- Using the Bourne et al. (1998) paradigm for online instruction, how do participants interact with the course?
- What is the range for time-efficiency with the selected paradigm and how will participants evaluate time spent?
- What are some of the barriers encountered with online instruction?
- What are some of the benefits encountered with online instruction?
- Are any of the revolutionary promises for CMC in higher education supported by this case study?

This methods chapter was organized around the following sections: orientation to qualitative research design, a description of participants, a description of the course, a description of the data collected and how that data was analyzed, and an audit trail report.

Qualitative Research Design

Online course presentation is uniquely suited to a qualitative research design, as indicated by Waggoner (1991):

Evaluating the use of computer conferencing in a collaborative learning activity involves the analysis of many interacting variables. Many of these may be measured using quantitative technique, but others require qualitative analysis. A case study offers the most comprehensive approach to understanding this complex process. (p. 145)

A case study was chosen for this dissertation because of the robust amount of potential data, the unique composition of the course materials, and the need for understanding the complex process of learning online.

While case study research is typically ill-defined, the value is well documented. Mason (1991) suggested that case study research was uniquely appropriate for CBI studies: "The advantages of this method are that it is possible to give a rich and wide-ranging picture of a conferencing application, providing multiple points of view and to develop standards and theory which can be tested by other methods and applications" (p. 112). The dynamic nature of CBI is repeatedly exclaimed by researchers and draws more research attention each day. As Henri (1991) pointed out, "CMC is proving to be a gold mine of information concerning the psycho-social dynamics at work among students, the learning strategies adopted, and the acquisition of knowledge and skills. An attentive educator, reading between the lines in texts transmitted by CMC, will find information unavailable in any other learning situation" (p. 118). Culmer (1997) indicated an advantage to qualitative research designs in his case study of a doctoral cohort working on the Web:

The fact that the student participants in the current study used the doctoral Web environment to access different parts of the Internet at times of their own choosing and for varying amounts of time for highly individualized purposes does not lend itself to highly structured experimental research design where confounding variables need to be minimized in the interest of maximizing internal validity. (p. 47)

Lincoln and Guba (1985) proposed guidelines for naturalistic inquiry, yet maintained that guidelines are difficult to dictate for such research, "Naturalistic studies are virtually impossible to design in any definitive way before the study is actually undertaken. Naturalistic inquiry is always carried out, logically enough, in a natural setting, since context is so heavily implicated in meaning" (p. 187). Interviews, observations, document analysis, and case studies are common in naturalistic inquiry and are well suited to educational classroom research. This study is necessarily qualitative to get at the overall picture -- to understand the scope of this online course's efficiency and interactive instructional impact.

Lincoln and Guba also wrote that naturalistic inquiry method is difficult to predict:

Within the naturalistic paradigm, designs must be emergent rather than preordained: because meaning is determined by context to such a great extent; because the existence of multiple realities constrains the development of a design based on only one (the investigator's) construction; because what will be learned at a site is always dependent on the interaction between investigator and context, and the interaction is also not fully predictable; and because the nature of mutual shapings cannot be known until they are witnessed. All of these factors underscore the indeterminacy under which the naturalistic inquirer functions; the design must therefore be "played by ear"; it must unfold, cascade, roll, emerge. (p. 208)

Merriam (1988) also wrote that case study research was well suited to the classroom and depends upon a variety of data. "The case study is preferred in examining contemporary events, but when the relevant behaviors cannot be manipulated. Thus the case study relies on direct observation and systematic interviewing" (p. 8). Merriam claimed that qualitative case studies develop because "researchers are interested in insight, discovery, and interpretation rather than hypothesis testing" (p. 10).

Whereas quantitative case studies seek to maintain a distance, or at least an unobtrusive presence, of the researcher, a qualitative case study may not.

Merriam declared the researcher's role in a qualitative case study is imperative:

The importance of the researcher in qualitative case study cannot be overemphasized. The researcher is the primary instrument for data collection and analysis. Data are mediated through this human instrument, the researcher, rather than through some inanimate inventory, questionnaire, or machine. Certain characteristics differentiate the human researcher from other data collection instruments: The researcher as instrument is responsive to the context; he or she can adapt techniques to the circumstances; the total context can be considered; what is known about the situation can be expanded through sensitivity to nonverbal aspects; the human instrument can process data immediately, can clarify and summarize as the study evolves, and can explore anomalous responses. (p. 19)

This researcher was one of the professors for the course in this case study and the designer of the online tutorials. That role is ideal for a naturalistic inquiry, particularly one that was designed to explore the results of employing the course design this researcher was so intimately involved in developing.

Lincoln and Guba (1985) suggested a case study is a logical choice when exploration is the purpose of the study: "How one defines the problem may determine whether one proceeds inductively or deductively. That is, the study may be exploratory, and develop theory, or it may be hypothetical-deductive and test theory" (p. 63).

Description of the Participants

The 39 students in this study were college undergraduates enrolled in a required course called "Principles of Communication" at a Midwest, private, liberal arts college. Two sections of the course in the fall semester participated in

the study. Each section was lead by a different professor; one professor had taught similar courses for ten years, the other professor, though an experienced college instructor, taught this course for the first time. In addition, students enrolled in a five-week summer term served as a trial study to work out problems in hardware and software configurations and to make appropriate adjustments. The trial study included less than ten students.

Purposive sampling is common in qualitative studies, especially those seeking to explore a course in a natural setting, allowing all students registered for the course to be part of the exploration. This study used purposive sampling, selecting both sections of an undergraduate college course in an ill-defined domain, primarily because this course was an exploration to develop theory in a natural, rather than contrived, setting.

Description of the Course

The college participating in this study maintained a core of general education-type courses which focused on developing ethical practice and leadership skills. The course chosen for this study was described thus:

Two foundational assumptions of this course are that communication skills are essential for successful social and vocational life and that communication competence is the mark of effective leadership. In this course, basic communication principles related to intrapersonal, interpersonal, small group and public speaking contexts will be introduced and discussed in theory and practice. (See syllabus in Appendix B, para. 10)

The course had several objectives (Appendix B, para. 11), some relating to guiding educational principles for the college's core classes, others relating

directly to course content: Students will increase their communication competency by...

- Recognizing the principles of communication underlying human communication events.
- Assessing the effect of one's self-concept upon communication effectiveness.
- Identifying verbal and nonverbal communication barriers.
- Evaluating interpersonal communication effectiveness.
- Participating in small group communication exercises.
- Practicing written communication skills.
- Practicing electronic communication skills.

These course objectives guided development of CAI interaction in this study.

While Markle (1990) and Overbaugh (1994) called for efficient response requests, part of the online exercises intentionally did not follow this mandate.

Paraphrasing may be "perilous" (Markle, 1990, p. 13), but students in this course were required to practice communication skills. Therefore, paraphrasing was required, short-answer questions were utilized, and standard written communication skills were fostered throughout the course. Grading such work is highly subjective. However, the two professors involved in the course reviewed together randomly selected assignments to test assessment reliability.

The course Web pages were developed using Claris Homepage (Appendices A through F). Interactivity was achieved through software known as "Forms.acgi" which communicated responses from the interactive Web pages,

routed through the college's server; responses were delivered directly to the appropriate professor's e-mail address.

Macromedia's Authorware Academic allows for nearly unlimited manipulation of response requests and feedback. To utilize most of this study's theoretical framework for feedback, Authorware or a similar product is recommended. Because support for this program was unavailable at the selected college, Authorware was not utilized. A comparatively simple Web authoring program, Claris Homepage, was used instead to develop all of the online pages and exercises.

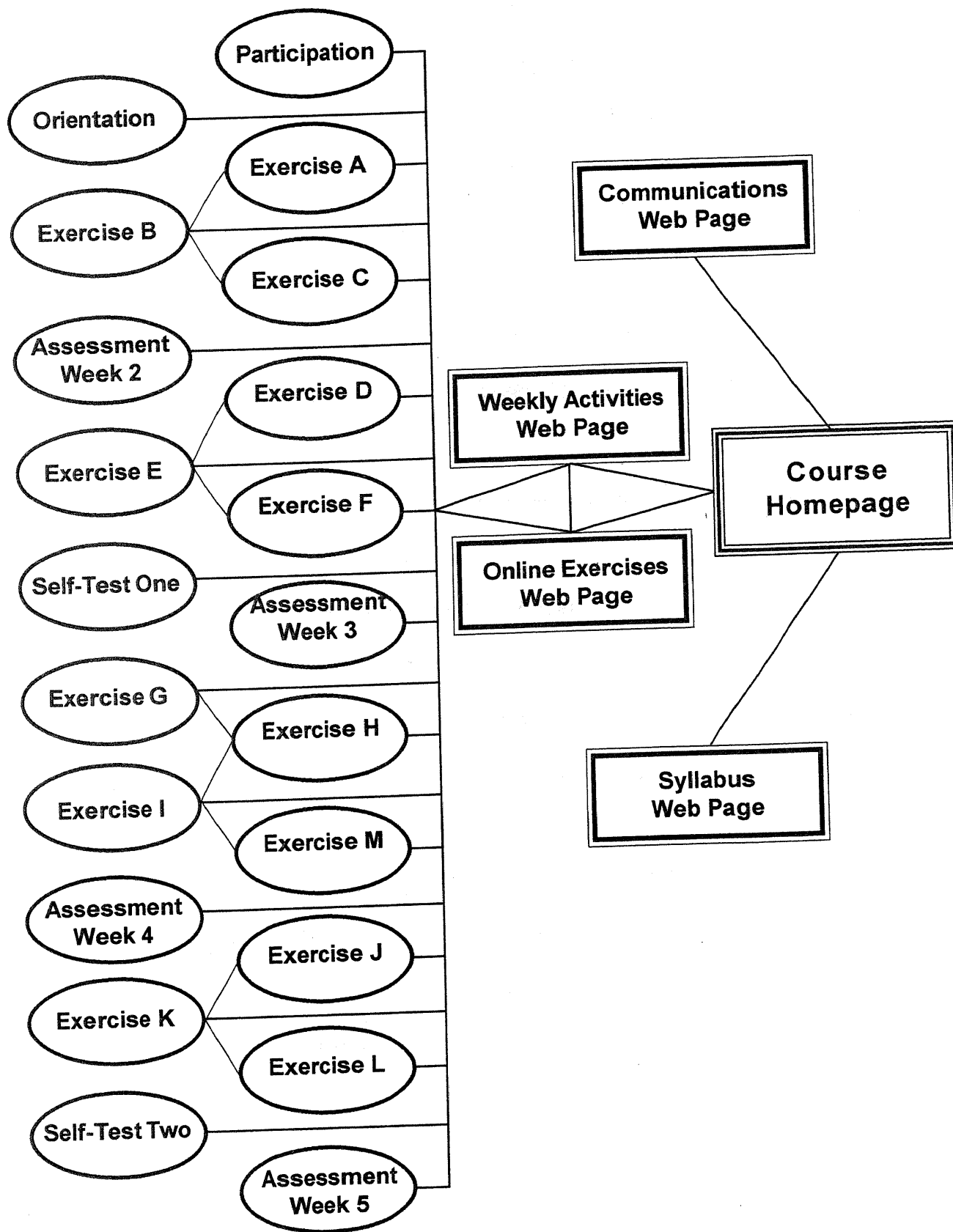
Access to the course was achieved by going to the "http" address assigned to it, using compatible Internet browsing software. The course homepage was not linked to the college Web pages, as the college did not currently own software that allows password protection against unauthorized use. Only registered students and appropriate faculty and staff at the college were given the Web page address.

The Web pages developed for the course began with the course homepage, then branched to four main "chunks" (see Table 4 for a flowchart on these pages and how they connected to each other):

- Course Syllabus.
- Weekly Activities (list of all assignments for each week in the five-week session).
- Online Exercises (list of all online exercises; did not include exercises that were communicated through the listserv).

Table 4

CAI Web Pages Flowchart



- Communications (provided access to the class listserv, to the professor's e-mail address, and to e-mail addresses for each student in the class).

Course participants met through the first week of the semester, to conduct orienting activities (including a pretest to determine if prerequisites were met or needed accommodation) and to prepare students for online instruction. When necessary, students who were unable to attend these classes interacted with the instructor by phone and/or e-mail. The CAI portion of the course spanned five weeks and covered the content provided by the course textbook, including:

- thirteen online, interactive exercises (see Appendix C, Exercises A through M);
- two student performance assessments (see Appendix D, "Self-Test One" and "Self-Test Two");
- four weekly course assessments (see Appendix E, "Week Two Assessment" through "Week Five Assessment");
- and four listserv queries seeking asynchronous responses (see Appendix F, "Week Two Query" through "Week Five Query" e-mail).

The interactive exercises were based upon the course textbook, which is Pearson and Nelson's (1997) An Introduction to Human Communication: Understanding and Sharing. Supplementary materials to the selected texts also provided material for interactive exercises:...

- a Power Point presentation that accompanies the selected text by Pearson and Nelson (Wheeler, 1997);
- an instructor's manual and test item file (Shaw, 1997);

- a faculty guide to accompany the text's telecourse version (Vidlak, 1997a);
- a student guide to accompany the text's telecourse version (Vidlak, 1997b);
- and a secondary text, still used at the college for similar communication courses that are not delivered online, DeVito's Essentials of Human Communication (1996).

The literature review for this dissertation yielded a descriptive list of techniques to develop effective online, computer-assisted instruction. This list was converted to a table, to show how (if) those techniques were used in the development of the five-week online session and the rationale behind decisions regarding the use of these techniques (see Table 5).

Data and Analysis

A pretest was administered before the CAI phase of the course began (Appendix G, "Orientation Exercise"). This pretest asked students to assess their computer literacy, course content knowledge, and their basic communication skills. This pretest was used to determine student preparation for the course, whether prerequisite skills were present, and as a tool to ascertain if course objectives had been met.

Data collected included responses to 13 online, interactive exercises (Appendix C, Exercises A through M). These exercises were moderately externally paced (approximately three exercises due each week, but students worked as far ahead as they chose). Student responses were assessed for level

Table 5

Utilization Rationale for the Theoretical Framework in Online Course Development

Topic area	Recommendation	<input checked="" type="checkbox"/> = used in case study	Rationale
Preparatory functions	1. Identify instructional need	<input checked="" type="checkbox"/>	Identified by college curriculum committee
	2. Conduct task analysis		A formal task analysis could not be located; however, the text and content are similar to several textbooks considered standards
	3. Identify clear, written instructional objectives	<input checked="" type="checkbox"/>	Objectives were established by curriculum committee and are in the syllabus
	4. Match objectives to criterion tests used to measure accomplishment	<input checked="" type="checkbox"/>	This step was handled by a faculty review committee which oversees the core courses
	5. Account for and accommodate learner objectives	<input checked="" type="checkbox"/>	An attempt was made to do this with the "Orientation Exercise" (Appendix G)
	6. Provide pretesting and/or advance organizers	<input checked="" type="checkbox"/>	Orientation Exercise served as an advance organizer

	7. Adequately prepare instructor to teach with selected methodologies	<input checked="" type="checkbox"/>	The first instructor (course designer) was working on a doctoral degree in education and had extensively researched and worked with selected methodologies; the second instructor was given extensive documentation to read and was "coached" by the first instructor in using selected methodologies
Teaching tactics	1. Identify all necessary prerequisites	<input checked="" type="checkbox"/>	The Orientation Exercise attempted to establish competency with prerequisites; students needing help to get online were given brief instruction before online exercises began
	2. Work in dyads		The online section of the course did not lend itself to dyads; however, these were used in the in-class instruction sessions that followed the online session

	3. Use cooperative learning	<input checked="" type="checkbox"/>	The online interactive modules did not rely on cooperative learning; however, the listserv exercises did, to some degree
	4. Match instructional strategies to student skill and experience	<input checked="" type="checkbox"/>	This was a concern for this course and the case study will be used to assess the structure of this course to make suitable adjustments in the future
	5. Encourage higher level cognitive processing where feasible	<input checked="" type="checkbox"/>	Higher level cognitive processing is utilized often, but not always (the rationale is that lower levels may be more suitable to a given objective, such as term definition)
	6. Encourage dialectical thinking	<input checked="" type="checkbox"/>	Utilized throughout the interactive online modules
	7. Encourage inductive, deductive and abductive reasoning	<input checked="" type="checkbox"/>	Utilized as appropriate in the interactive online modules
	8. Utilize procedural facilitation where feasible		Selected software could not comply with this directive

	9. Encourage discrimination learning, concept formation, problem solving and knowledge transfer	<input checked="" type="checkbox"/>	The interactive online modules utilized these teaching tactics where feasible
Content maneuvers	1. Cover all objectives with content	<input checked="" type="checkbox"/>	Determined by curriculum committee and faculty review
	2. Include content that is related to objectives, task analysis and instructional need	<input checked="" type="checkbox"/>	Determined by curriculum committee and faculty review; also assessed by students
	3. Communicate relative importance of tangential information	<input checked="" type="checkbox"/>	The text was selected with this criterium in mind; the interactive modules also utilized this technique
	4. Use programmed instruction	<input checked="" type="checkbox"/>	Where feasible, programmed instruction was utilized in the interactive modules
	5. Empirically test content	<input checked="" type="checkbox"/>	This case study was at least a beginning for such a test
	6. Provide adequate examples to promote concept formation	<input checked="" type="checkbox"/>	Concept formation was a goal of this course and was tested by online tutorials, the listserv exercises, and tests

	7. Provide sound subject matter	<input checked="" type="checkbox"/>	The soundness of subject matter was comparable to similar courses
	8. Adapt content to student skill and experience	<input checked="" type="checkbox"/>	Course content was developed through research in human communication
Presentation logistics	1. Use logical sequencing	<input checked="" type="checkbox"/>	The sequencing in this course was typical of similar courses
	2. Use non-linear connections where feasible		This technique was not utilized for this course
	3. Encourage non-linear investigation where feasible		This technique was not employed in the online portion of this course
	4. Follow principles for skillful writing and clear communication	<input checked="" type="checkbox"/>	The interactive modules were edited by two English professors and several students
	5. Use good design	<input checked="" type="checkbox"/>	Careful consideration was given to design of interactive modules; however, "good design" of online course pages was ill-defined when this course was developing

	6. Reduce load on memory	<input checked="" type="checkbox"/>	Where feasible, all material needed to answer questions was either readily available on screen or in the text (which students were encouraged to keep available while online)
	7. When using necessary animation, maintain efficiency		Animation was not used in this design
	8. Provide adequate support technicians and resources	<input checked="" type="checkbox"/>	The course was designed with the aid of the computing services department and was intentionally kept simple to avoid unnecessary complications
	9. Protect student privacy	<input checked="" type="checkbox"/>	Student privacy was maintained
	10. Protect program from unauthorized use		The program was established to be somewhat "hidden" from casual observers, but was not "protected" with appropriate software
Interactive strategies	1. Use response requests related to objectives	<input checked="" type="checkbox"/>	Response requests were related to objectives
	2. Require interactivity	<input checked="" type="checkbox"/>	Interactivity was required

	3. Require interactivity that is overt and active	<input checked="" type="checkbox"/>	Interactivity was overt and active, or reports were required on covert activity
	4. Utilize moderate external pacing	<input checked="" type="checkbox"/>	Students were encouraged to work ahead, but deadlines were set at weekly intervals
	5. Maintain efficiency with interactivity	<input checked="" type="checkbox"/>	Responses from students were either extremely efficient or designed to encourage verbal expression (one of the objectives)
	6. Empirically test interactivity	<input checked="" type="checkbox"/>	This case study utilized such a test
	7. Provide feedback where feasible	<input checked="" type="checkbox"/>	Where feasible, feedback was provided
	8. Provide correct responses and KCR where feasible	<input checked="" type="checkbox"/>	Where appropriate, KCR and correct responses were provided
	9. Provide elaborative, but efficient, feedback		Elaborative feedback was not feasible with selected software; professors provided some elaborative feedback
	10. Provide immediate feedback		Immediate feedback was not possible with selected software

	11. Provide positive feedback	<input checked="" type="checkbox"/>	Positive feedback was provided as often as possible to each student
	12. Present feedback with non-contingent, but efficient delay		Feedback delay was not possible with selected software (delay in this technique refers to the duration feedback is visible to the student)
	13. Foster performance realism when possible	<input checked="" type="checkbox"/>	Performance realism was a significant consideration throughout this course
	14. Provide performance reports	<input checked="" type="checkbox"/>	Performance reports were provided weekly
	15. Record the number of error responses		Not possible with the software utilized for this course
	16. Adapt number of response requests to student performance		Not possible with the software utilized for this course
	17. Encourage reflection with response requests	<input checked="" type="checkbox"/>	This technique was utilized where feasible
	18. Encourage multiple passes through content	<input checked="" type="checkbox"/>	The interactive modules encouraged multiple passes

	19. Identify conceptual hierarchies and use interactivity to process		Not applicable to this course
	20. Provide adequate range in response requests to encourage concept formation	<input checked="" type="checkbox"/>	Interactive modules did encourage concept formation
	21. Conduct administrative tasks through computer		The software selected for this course did not allow utilization of this technique
	22. Use RULEG and a higher level of cognitive processing	<input checked="" type="checkbox"/>	Where feasible, RULEG was used and a higher level of cognitive processing was encouraged

of interactive communication, using Henri's (1991) guide for interactivity; the level of cognitive involvement, using Markle's (1990) guidelines; and pacing.

Two student performance assessment instruments (see Appendix D, "Self-Test One" and "Self-Test Two") provided data. These instruments were analyzed for level of cognitive involvement, pacing, and the number of incorrect and correct responses.

Weekly course assessments (Appendix E, "Week Two Assessment" through "Week Five Assessment") measured student reaction to course content, interactivity, pacing, and student perceptions regarding efficacy and efficiency of the CAI experience.

Students participated in asynchronous chats, where students posted their reactions to issues raised on the provided listserv (Appendix F, "Week One Query" through "Week Five Query"). In addition, students had the option to post responses to each other individually and to the instructor. Responses to the listserv and the instructor were used for data analysis.

This researcher interviewed the professor of the other section of the Principles of Communication course, basing early interview questions on observations made throughout the CAI experience and then letting the interview evolve. Lincoln and Guba (1985) describe the nature of this kind of analysis as a naturalistic approach with an open-ended purpose:

Data analysis is open-ended and inductive for the naturalist, in contrast to the focused and deductive analysis common in conventional inquiry. Since the form of the data that will ultimately be produced by the human instrument is unknown in advance, the data cannot be specified at the beginning of the inquiry. Further, there are no a priori questions or hypotheses that can preordinately guide data-analysis decisions; these

must be made as the inquiry proceeds. Since the data from a naturalistic inquiry are likely to be qualitative, statistical manipulations have little if any relevance; questions of fit to underlying assumptions and relative power are not at issue. What is at issue is the best means to "make sense" of the data in ways that will, first, facilitate the continuing unfolding of the inquiry, and, second, lead to a maximal understanding (in the sense of *verstehen*) of the phenomenon being studied in its context. (pp. 224-225)

This researcher also maintained a journal throughout the CAI development and implementation phase, recording time spent, development issues, perceptions and notes regarding benefits and barriers encountered.

These materials for data analysis are not only ideal for a qualitative case study, they follow the guidelines set by Dean and Whitlock (1992) for validating computer based training programs: "The course author can hope to get the following data when the students have completed the course: pre- and post-test results; the time each student has spent on the computer and on the overall course; the responses of all the students; the students' evaluation of the course; any difficulties the students may have had" (p. 108). In addition, this data yields the responses from both professors to their students to conduct course management activities, as well as the professors' evaluation of the course and a description of any difficulties the professors may have had.

Audit Trail Report

Following the guidelines set forth by Gall, Borg, and Gall (1996), an audit trail was conducted (Appendix I: A Qualitative Case Study Audit Trail):

An audit trail is documentation of the research process followed in the case study. Six types of documentation should be considered for inclusion in an audit trail: (1) source and method of recording raw data; (2)

data reduction and analysis products; (3) data reconstruction and synthesis products; (4) process notes; (5) materials relating to intentions and dispositions; and (6) instrument development information. (p. 576)

The audit trail confirmed the dependability and confirmability of this case study.

With accommodations for the qualitative nature of this case study, the audit trail also determined the validity and reliability of this research.

Chapter 4

Analysis of the Data

This study sought to answer these questions:

- Can online (computer-assisted) college instruction, using theoretically sound instructional design, provide rich instructional interaction without sacrificing time efficiency?
- Using the Bourne et al. (1998) paradigm for online instruction, how did participants interact with the course?
- What was the range for time-efficiency with the selected paradigm and how did participants evaluate time spent?
- What were some of the barriers encountered with online instruction?
- What were some of the benefits encountered with online instruction?

This chapter is organized around these research questions, with the following categories: description of course/student interaction, depth of interaction achieved, breadth of interaction achieved, time efficiency and student evaluation of time spent, barriers encountered, and benefits encountered.

The data from this case study included a variety of materials, most of which were encountered through online interaction and e-mail. The results of this study are discussed under the following categories in this chapter:

1. The "description of course/student interaction" section includes a description of the data collected and an analysis of the orientation exercise as it relates to the other collected data.

2. The “depth of interaction achieved” section includes an analysis of listserv interactivity data and an analysis of online tutorial interactivity data.
3. The “breadth of interaction achieved” section includes an analysis of listserv interactivity data based on Henri’s (1991) model of interactivity, and an analysis of online tutorial completion and accuracy on two tests over textbook content.
4. The “time efficiency and evaluation of time spent” section includes an analysis of student reports of time spent on various tasks in comparison to the student assessments of those tasks.
5. “Barriers encountered” were garnered from the instructors, course e-mail, and student assessments.
6. “Benefits encountered” were extracted from the course e-mail and assessments by students and instructors.

Description of Course/Student Interaction

When the class began, students came to class, meeting face-to-face with each other and the instructor. Students were informed that this was the last time the class would meet throughout the online section (five weeks). An oral presentation described the online portion of the course. The instructor covered the contents of the syllabus and showed hardcopy samples of the main course Web pages (the contents page, the syllabus, the weekly activities page, the chart linking all online tutorials, and the communications page). The students were

also shown a hardcopy sample of the orientation exercise (the first online exercise required from students).

The orientation exercise served as an advance organizer, reflecting course objectives, and sought student responses regarding their computer literacy, course content literacy, and communication skills in a self-assessment format. Student responses to this exercise helped course instructors determine the level of prerequisite competencies among students and allowed remedial intervention as required. Since "Principles of Communication" was designed as a sophomore-level course, and the course designer anticipated that students would have already taken an introductory computer course, computer literacy was not predicted as a problem, but certainly appeared to be a necessary prerequisite. This researcher worked briefly with two students from section one to help them understand how to access the course homepage, how to navigate between course Web pages, and how to submit online tutorials. This instruction took less than 15 minutes. The other instructor reported similar intervention measures.

The computer literacy section of the orientation exercise contained nine response requests, where "1" reflected "not even close to describing me or my situation" and "5" reflected "that's me!" The mean and mode were calculated, as well as the standard deviation, for each question to show the average of scores, the most frequent score, and the variance of scores (see Table 6).

The content literacy section of the orientation exercise covered course objectives relating to course content, but responses were a simple "yes" or "no"

Table 6

Orientation Exercise: Computer Literacy Section

Question (response n = 33)	Mean	Mode	SD
My online communication skills are excellent.	3.030	3 (12)	1.33
I can get on the WWW and do simple searches.	3.515	5 (12)	1.44
I know how to send e-mail.	3.606	5 (16)	1.60
I know how to use listservs.	2.424	1 (12)	1.37
I have a place in my home or at work with computer access and where I can work or study for extended periods (30 minutes to 2 hours) without interruption.	3	1 (11)	1.68
I have someone or resources nearby to help me with any technical problems that may develop while I am working online.	3.182	4 (11)	1.38
I read my e-mail regularly and respond within 24 hours when appropriate.	3.727	5 (11)	.88
I am an independent, self-directed learner.	3.242	4 (15)	1.62
I usually have no trouble meeting deadlines.	3.758	4 (13)	1

to indicate a self-reported ability to complete ten key competencies. A nominal count is provided for the answers, including questions which elicited no response (see Table 7).

Of the 33 students responding to the orientation exercise, 23 indicated they could “easily discern the difference between facts and inferences” while 10 indicated they could not. The textbook chapter on verbal messages covered the concept of making assumptions based on incomplete information (drawing inferences) and the online tutorial “Exercise F” tested the students’ ability to separate fact from inference. Of the thirty students completing exercise F, none answered all ten fact/inference questions correctly. The majority of students missed at least five of the questions. All of these students had access to a Web page that provided a clue about the correct responses and after the students received this information, they were asked to describe the difference between facts and inferences. All of the students answered this question correctly. The professors were not surprised by these results. After using several variations of this particular activity, the professors predicted the students would indicate they could tell the difference between facts and inferences, but when put to the test, would fail to get a perfect score. The activity is designed to encourage students to examine how often they “jump to conclusions” even when they know the difference between the concepts of “fact” and “inference.” The professors felt this activity was one among many in the online tutorials which achieved the desired effect.

Table 7

Orientation Exercise: Content Literacy Section

Questions (response n = 33)	Yes	No	Blank
I can list several key considerations for effective electronic communication.	14	19	0
I can compare various group roles in terms of benefits and costs for each.	12	20	1
I can describe the necessary steps for developing an effective speech.	17	16	0
I can list the benefits and costs of five key strategies for conflict management.	7	26	0
I can explain how changes in physical, cultural, social-psychological and temporal contexts change the meaning in communication.	14	19	0
I can list the main barriers to effective communication and can offer suggestions for avoiding or overcoming these obstacles.	16	17	0
I can compare the characteristics of verbal and nonverbal communication.	25	8	0
I can list the characteristics of active listening.	20	13	0
I can easily discern the difference between facts and inferences.	23	10	0
I can clearly differentiate between confirming and disconfirming communication.	10	23	0

The communication skills and skill practice section of the orientation exercise sought to determine what skills students believed they already had and how often some skills were practiced. Again, students could respond "1" through "5," where "1" indicated "not even close to describing me or my situation" and "5" reflected "that's me!" The mean and mode were calculated, as well as the standard deviation, for each question to show the average of scores, the most frequent score, and the variance of scores (Table 8).

Of the 33 students responding to the orientation exercise, where minimal personal information was sought, all were 18-24 years old, 22 were male and 11 were female, 24 expected an "A" for a course grade, eight expected a "B," and one student expected a "C." Six participants did not respond to the orientation exercise.

Besides the orientation exercise, data collected for this results chapter include the online tutorials (13 tutorials which correspond to the assigned chapter readings in the textbook), four listserv queries and the responses these elicited, two online tests, and four assessments which asked students to record the time spent on course activities, as well as an analysis of usefulness for online tutorials and tests. Following the online section of the course, I interviewed the second instructor for this course. A journal, maintained throughout Web page development and the online section of the course, also serves as data for this results chapter.

Table 8

Orientation Exercise: Course Skill and Skill Practice Section

Questions (response n = 33)	Mean	Mode	SD
My interviewing skills (as an interviewer and interviewee) are highly developed.	2.848	3 (14)	1.09
I look for meaning not only in words but in nonverbal behavior as well.	3.515	3 (13)	1
I use self-disclosure carefully, weighing the benefits and the costs.	3.061	3 (13)	1.09
My self-concept is clear, well-defined, and as accurate as possible.	3.515	4 (14)	1.12
I recognize stereotyping in my perceptions and in the communications of others.	3.606	3 & 4 (10)	1.09
I frequently practice my public speaking skills.	2.394	2 (12)	1.25
I frequently practice my written communication skills.	2.606	2 (10)	1.2
I own and know how to use a handbook for MLA writing guidelines.	2.727	1 (9)	1.55
My interpersonal communication skills are highly developed.	3	3 (16)	1.09
I am an effective leader in small group interactions.	3.424	4 (12)	.94

Depth of Interaction Achieved

This section includes an analysis of listserv interactivity data and an analysis of the online tutorials interactivity data. The listserv queries were selected to enhance key points in the assigned readings for the week. Students were encouraged to respond not just to the listserv query, but to responses by other students. The queries were:

- Introduction query (week two). "Send an e-mail message to the Listserv to introduce yourself to the class. State your first and last names, your major, and your favorite hobby. We also want to know what you are an expert at. Don't say, 'nothing!' Pick a topic or activity you could teach us."
- Lying query (week three). "Is it ethical to exaggerate your virtues and minimize your vices to win approval? How about to get a job? What are your parameters for lying?"
- Privacy query (week four). "Your personal parameters for privacy will influence how you communicate with others. What are your parameters for privacy? Try this as a starting point: Should parents go through their child's room or belongings to find out what the child is doing? Should parents read their child's mail? How about e-mail? Do children have a right to privacy? What if the 'child' is really an adult, living at home?"
- E-mail quality query (week five). "Your Listserv query is different this week. Please go to the Internet and find this page: [Web page address inserted here]. Read through the ten tips provided about composing effective e-mail. Then compose a response for the class about how you think we have been

doing in our e-mail 'conversations.' Use another student's work as an example of your point(s). Have we been concise? Have we communicated clearly? Have we paid attention to guidelines for effective communication (like spelling)? What could we do to improve our e-mail communication?"

Analysis of responses to introduction query. The students were advised to keep their query responses brief, concise, and interesting since every student was required to read every response. Students responded with a mean average of 40 words to this listserv query; about 20 percent lower than recommended by the instructors. The students tended to respond directly to the questions in the query, rather than developing complete, expository paragraphs, with responses resembling "name, rank and serial number" reactions. One student attempted humor, relying on a personal reference to a nickname he had earned from friends on campus. He also wrote in a "spoof" style, responding to the assignment with satire: "My name is Joe Smith and I'm an alcoholic. . . I am an expert at laying 12" ductile water main. If you ever wanted to lay 12" ductile water main for any reason, I could tell you how to do it." Only one student wrote a paragraph utilizing personal exposition:

I hate bragging or anything that sounds like it, but I know I'm a good writer; it's one of the few things I think I can make a career of. I've had plenty of practical experience. . . The important lesson I've learned is that if you went to a job interview and somehow managed to make it rain in the room, then walked across the river that was produced by your conjured rain, the interviewer (standing in waist-deep water) would say, "So where did you go to college?" I never had an answer to that question . . .

One of the female students chose to make her listserv response technically helpful to students on frequently discussed issues:

I can't say I am really an expert at anything, but there are a couple of ways I can help classmates. First I do work study in the Financial Aid office and can help students if they have simple questions about loans and things. Second, for any of the women in class that like to exercise, I work at a new women's fitness center in the mall that is really fun . . .

The underlying purpose of this exercise was to provide students with a simple introductory query using the listserv, to help students "meet" each other, and to provide the groundwork for future contact. Activities which followed this online portion of the course required students to feel comfortable with each other and to work together in small groups. No follow-up research was conducted to determine if the exercise was successful, other than checking with the instructors. Both course instructors felt the introductory listserv exercise was too elementary and that students didn't use it as intended. While this provided a simple exercise to practice with the listserv system, the instructors were not expecting the students to respond at a "superficial" level.

An immediate response from the instructors, asking students to expand on their introductions, may have helped improve responses and may have elicited more detailed e-mail. But both instructors stated they felt overwhelmed with the responses, since this listserv query, the orientation exercise, and three online tutorials were due within the same five working days. This was a theme for the instructors throughout the online portion of the course. Students tended to wait until the final hours of their weekly deadlines to respond to the online exercises and the instructors often received in excess of 100 e-mail messages within a four-hour period at the end of each week, preventing the possibility of "immediate" online feedback.

Analysis of responses to lying query. Responses to this query disappointed the instructors as well, but appeared to be closer to their expectations. I felt the main advantage with this online query was that more students had an opportunity to respond to the question, in comparison to an in-class discussion I have conducted on this topic in a traditional classroom system. However, this topic tended to generate more response variety in a traditional classroom than I detected with the responses in the listserv format. In this online format, the students relied on one of only two positions expressed: either it was acceptable to lie to get a job or lying was never acceptable. In a traditional format, students tended to go beyond the initial question, using it as an opening to discuss several situations where lying might occur, and exploring the many options people have. With this listserv query, the students answered the question and did not explore.

The responses to this listserv revealed an interesting issue for the professors. This was a course in communication, but the listserv responses (and some of the responses from the online tutorials) were quite difficult to read because students made frequent typing, spelling, and grammatical errors (some of the quotes utilized in this chapter have been edited for clarity and ease of reading, but care was taken to preserve the intent and significant content of each passage). The system of sending listserv responses to the professors also contributed to the problem by adding several symbols that detracted from readability. A typical response, complete with errors and some software-added symbols, appeared like this:

WEEK 2 QUESTION: Is it ethical to exaggerate your virtues=20 and minimize your vices to win approval? How about to get=20 a job? What are your parameters for lying?>

No it is not ethical but the truth is all do exaggerate our virtues to = gain approval . We all want to fit in a group or with a person and are = afraid to be too broad or out going .

To get a job it is best not to exaggerate virtues and minimize vices = once a boss or co worker finds out what you are really like it will = sacrifice your position and make you uncomfortable in the work place . = But job hunting is very hard and you have to be very competitive and = sometime exaggerating is a easy way to gain approval .

When a lie could change a persons perspective of me or change there = opinion of me [sic]

The purpose behind this listserv query was to explore the concept of truth and honesty, as well as to explore the student's formation of communication boundaries. Beyond that obvious intent, the professors also hoped to generate a dynamic online discussion, but did not. The professors concluded a chat-room style discussion may have achieved the desired result, but would have sacrificed asynchronous benefits. One professor attempted to generate more discussion by joining the listserv query with her own response, about mid-way through the week, but received no e-mail reactions from students to her additional prompt.

Analysis of responses to privacy query. While the number of responses dropped to 27 (from 39 possible) with this listserv query, the professors reported that this was the best in terms of quality of responses. The students tended to respond earlier in the week (more on Tuesday and Wednesday) instead of waiting to the final hours on Friday, as well as responding with more elaborative paragraphs (with a mean average of words that was double the first query response). Their responses also tended to be more emphatic. The professors concluded the students found the query itself more closely related to their

personal circumstances than the previous queries, which complements research findings suggesting a match between instructional strategies to student skill and experience (Belland et al., 1985; Gau & Madison, 1993; Ross et al., 1985; Scardamalia et al., 1989). The following response shows how students began to rely on personal experience to answer this query:

I am totally against my parents rummaging through my room and my mail. My mom and I had a huge argument once because she opened some of my mail. It really angers me when people look through my belongings. It's a federal offense to mess with other people's mail, so they are breaking the law when they open up a letter addressed to you. As far as going through my room goes, I'm fairly open about that as long as they don't dig through my drawers or look in my fridge. This summer my mom found a cigar in one of my drawers in my dresser, and it's not like she was putting clothes away in my drawer, she was just looking, and I got really angry. I truly believe that since I have the whole basement to myself, I should be able to do whatever I want to do down there, without the worry of having people look through my belongings. Of course, maybe she figured that [since] where I live 9 months out of the year [the college officials] can check my room whenever they want to, so can she. [sic]

Some of the students were quite brief in their replies, but no less reliant on self-disclosure: "My son and I respect each other's privacy. We don't seem to have anything to hide from one another. . . . Respect and knowing one another [are] the key. And the lock is love."

When students composed a response without personal reflection, they were still more elaborate in their responses to this query than to other queries. One student provided this concise response, which summarizes the majority of student opinion on the topic, as well:

I think a parent should only go through their child's room when there is a reason to. If a parent is concerned about their child and want some answers, I think there is nothing wrong with that. Now if the parent is going through their things just because they need a reason to get mad at them, or just because they are curious, I think this is wrong. Genuine

concern is the only reason you should go through your child's belongings. Children are entitled to privacy, but only to a certain extent. Until it is dangerous, then it is the parent's job to get to the bottom of it, even if it means invading your child's privacy.

With this listserv query, dissenting opinions were shared openly (if indirectly). A male student offered one of the shortest, yet succinct, responses and offered it later on in the week, providing an alternative perspective to many of those submitted earlier: "My privacy parameter is large. My parents would never go through any of my stuff. I never go through their stuff; it is a mutual agreement. I ask my parents for their opinion and sometimes I get it without asking. But they would never invade my privacy."

Analysis of responses to e-mail quality query. The final listserv query was an effort to get students to explore the Internet for information on human communications and to explore the professors' perspective that the e-mail responses sometimes failed to communicate clearly. This was a planned strategy that complemented the results of the orientation exercise, where 19 students indicated they did not know how to compose effective e-mail. The professors sent a query directing students to a Web page offering guidelines for composing effective e-mail and sought an analysis of the listserv responses based on those guidelines. Students replied to this query less enthusiastically than to the previous query (the number of responses dropped to 22 and the mean average for words dropped to the low found with the introduction query). Students generally found the listserv responses effective and generally overlooked the problems with grammar, spelling, and punctuation lamented by the professors. One student provided this thoughtful response:

I have not been quite concise when communicating using e-mail. I usually don't capitalize, or use proper punctuation either. I guess the reason I do this is just laziness. The fact that it is a form of informal communication is another reason. Ways to improve this would be to just practice every time I use e-mail.

Few students provided evidence that they had, indeed, read the required WWW page regarding guidelines for effective e-mail. Those who indirectly referred to the guidelines indicated key words such as "appropriate capitalization" or "don't use all caps to compose e-mail." With the most concise listserv response, a student simply wrote, "I agree on the rules that they say and you should think before you type."

The query asked students to use a sample e-mail response in their reply, but none of the students followed that suggestion. Students were encouraged to offer advice for improvement, which resulted in some useful student-generated guidelines. Two students suggested using the college's e-mail software to run a spell-check on the messages before sending, a useful suggestion for students who were not well acquainted with the software; others suggested simple practice would improve correspondence.

One of the complaints the instructors voiced was the lack of clarity in some e-mail compositions. The students did not echo that concern, but often provided evidence that clarity was an issue with confusing replies like this: "I think that most people are doing good with the online and email but more like me that's use to a classroom setting may be having a little problems [sic]."

Finally, one instructor indicated a problem found in the e-mail responses and online tutorials, which she called the "whole screen phenomenon." She said

students appeared to be quite concerned with keeping their responses to the immediately visible screen, avoiding scrolling at any cost. One of the students wrote about this concern: "Everyone seems to be clear and concise without using up the whole screen to type their reply." No attempt was made in this online course to explore the "whole screen phenomenon" further.

Analysis of online tutorial interactivity. Interactivity quality is at least partially dependent upon the quality of the response requests. While multiple-choice, fill-in-the-blank, and true/false response requests tend to promote efficiency in response time, as well as effective and objective response analysis (readily handled by appropriate software), Rothwell and Kazanas (1992) provide a convincing argument for the subjectivity of student-generated answers. Leading students to a higher level of cognitive involvement (analysis, synthesis, and evaluation) can be achieved with artfully crafted response requests, as demonstrated by Markle (1990), but creating those response requests is time-consuming for the instructor and quite difficult in ill-structured domains like human communications. As the online tutorial developer, I had to decide if developing "Marklized" response requests was an efficient use of development time. I chose to develop some questions following Markle's guidelines (for instance, questions using a variation of the RULEG design), while some response requests were based on the guidelines provided by Rothwell and Kazanas (relying more on short answer essays and critical analysis of observations). I also tried to provide some variety, with some response requests written to elicit a lower level of cognitive involvement (recognition and/or recall

responses), rather than a higher level requiring fine or gross discrimination skills. Students were asked to provide declarative responses (providing or determining facts) which would cross the range from lower to higher cognitive involvement, as well as procedural responses (making inferences or reflecting) which tends to evoke higher cognitive skills (Howard, 1987). Determining the quality of response requests, then, was highly subjective in many cases, time consuming for both instructors, and not suitable for computer-controlled analysis. Both professors suggested that the demands on their time were so high, developing response requests that could be scored through appropriate computer software is preferable to the system utilized in this case study.

A cross-section of the response requests revealed that students tended to minimize their answers (providing quite brief analysis which did not fully answer the posed question), relied primarily on paraphrasing the text rather than verbatim quoting (most students switched to verbatim quoting on the two tests), found RULEG-based response requests difficult (students missed these questions more often than questions which were less oriented to problem-solving), and often drew faulty or incomplete inferences.

Breadth of Interaction Achieved

This section includes an analysis of listserv query interaction based on Henri's (1991) model of interactivity, and an analysis of online tutorial completion and accuracy on two tests over textbook content.

Henri's (1991) model for interactivity (Table 1) described the breadth of responses or comments elicited during interactive exercises. Explicit interaction is characterized by direct responses (responding to a prompt by referring directly to that prompt) and direct commentary (building on a prompt, rather than responding to it, but still referring to that prompt directly). Implicit interaction is characterized by indirect responses and commentary. Independent statements make up the final category suggested by Henri.

A review of the depth of interaction elicited by the weekly listserv queries reveals that most (94 percent) were indirect responses. Just six responses could be classified as explicit responses with direct reference to the query. The e-mail software used by this college allows the user to type in a subject line for new messages, so students had the opportunity to use that feature. They used it frequently to indicate the assignment type ("orientation" or "listserv") or, rarely, the topic of the query ("introduction" or "privacy"). Students infrequently (six percent) included the actual query itself in their response message, which was another feature allowed by the e-mail software.

While not a part of Henri's prescription for analyzing the breadth of interactivity, the number of responses and the word count of responses was examined. The first listserv query elicited 30 responses (out of 39 possible), the second dropped to 29 responses, the third dropped to 27 responses, and the final listserv query had 22 responses out of 39 students participating in the study. Students were encouraged to keep their e-mail listserv responses concise. The mean average word count of the first listserv was 40 words, while the mean word

count for the third listserv query was 85 words. In responding to the final listserv query, the students were not only learning about effective e-mail strategies (corresponding with the text chapter on verbal communication), but also they were analyzing the quality of their e-mail questions. Some students spoke to the issue of brevity:

- “I think that we could improve our online communication by being a little more explanatory in some of the responses.”
- “I have tried to be as clear as I can without taking up too much space.”
- “I think that we have been doing a really good job at keeping our conversations short and to the point.”

Of the 39 participating students, just five completed all of the 24 online assignments (four assessments, two tests, four listserv response requests, one orientation exercise, and 13 tutorials). The breakdown for online assignment completion was:

24 exercises = 5 students	17 exercises = 4 students
23 exercises = 5 students	16 exercises = 0 students
22 exercises = 4 students	15 exercises = 2 students
21 exercises = 2 students	14 exercises = 3 students
20 exercises = 2 students	13 exercises = 2 students
19 exercises = 5 students	12 exercises = 1 student
18 exercises = 3 students	2 exercises = 1 student

The professors were not satisfied with this level of completion. They felt that multiple passes through the textbook were necessary, which would be more

readily accomplished if all students had completed all of the assignments. In addition, the professors agreed that many skills in human communications require extensive practice to achieve mastery. Therefore, the professors would have preferred evidence that the students had practiced critical thinking, concept formation, and problem solving skills throughout the online portion of the class. The professors also would have preferred evidence that the students were applying the skills in the textbook to a specific, group-oriented project, while the students were reading about group roles. That was not accomplished through the listserv queries, which was the only group-oriented activity instigated by the online activities in this case study. The instructor of the second section of this course stated, "Can't we encourage group interaction online? If we can, we didn't get there with this course design. I think study-group activities would be possible to encourage group sharing and processing of this material."

The first online test covered reading assignments and online tutorials over two weeks (six chapters in the text, two listserv queries, and six online tutorials), with 50 potential points. The accuracy reports for the 24 students who completed the test resembled a typical bell curve, but 15 students didn't complete the test; their scores were:

47 points = 1 student	40 points = 1 student	34 points = 1 student
45 points = 2 students	39 points = 1 student	33 points = 3 students
44 points = 1 student	38 points = 2 students	31 points = 1 student
43 points = 1 student	37 points = 3 students	16 points = 1 student
41 points = 2 students	35 points = 4 students	

Scores for the second online test were similar, with 27 students completing the second test and 50 points possible:

47 points = 3 students	42 points = 3 students	37 points = 1 student
45 points = 1 student	41 points = 4 students	36 points = 3 students
44 points = 3 students	39 points = 1 student	34 points = 3 students
43 points = 3 students	38 points = 1 student	33 points = 1 student

Once again, the scores of students completing the test roughly follow a normal distribution, but 12 students didn't complete the test. The questions that tended to result in incorrect responses were those that relied on evidence of concept formation or problem solving, rather than simple recall or recognition. For both tests, students tended to provide verbatim quotes, rather than paraphrasing, when questions asked for short answers. While the number of students completing the tests disappointed the instructors, the instructors felt the students who did respond reached an anticipated level of accuracy. In fact, analysis of student performance indicated it was slightly better on the tests than on the tutorials, although analysis of tutorial responses was highly subjective (unlike the tests).

Following the guidelines provided by Markle (1990) and Mager (1984), the objectives for the course were compared to the online exercises to determine if all the objectives were covered by these teaching tools (Appendix B, "Syllabus"). The objective dealing with conflict management was minimally handled by online exercises, but was not a topic in the textbook (except indirectly). This could be a problem resulting from changing the textbook but not the course objectives, or it

could be faulty course design (the online exercises were designed as tutorials rather than information bearing tools, so conflict management was not fully explored in content). All of the other objectives were specifically addressed by the online exercises and the text. Since most of the objectives were covered through a variety of tutorials, listserv queries, tests or reading assignments, the professors felt the objectives were adequately covered throughout the course (except for the objective dealing with conflict management).

Time Efficiency and Evaluation of Time Spent

This section includes an analysis of student reports on time spent for various tasks in comparison to the student assessment (required weekly) of those tasks. Students reported the time they spent on reading assignments, online tutorials, listserv queries, and rated the online portion of the course overall in comparison to other courses. The mean and mode were calculated, as well as the standard deviation and range of time reports, for each assignment to show the average of time spent, the most frequent time reported, and the variance of time reports within the range (Table 9).

The underlying theme in the vast majority (86 percent) of the assessment forms indicated the online tutorials were “useful in processing the assigned readings.” Explanations for this positive assessment were based on at least one of these five components:

- clarification of the text,
- multiple passes through the text,

Table 9

Time Spent Records: Reading, Online Tutorials, and Listserv Responses

Assignments	Mean (minutes)	Mode (minutes)	SD	Range (minutes)
Reading, week two (n=28)	73	60 (6)	39.87	25-180
Online tutorials, week two (n=29)	74	120 (6)	40.67	20-150
Listserv query, week two (n=30)	19	5 (8)	19.95	5-90
Reading, week three (n=22)	66	60 (6)	29.47	20-120
Online tutorials, week three (n=23)	89	60 (8)	31.38	30-150
Listserv query, week three (n=29)	25	5 (7)	34.92	5-120
Reading, week four (n=37)	75	30 (8)	43.84	15-180
Online tutorials, week four (n=37)	81	90 (9)	30.49	30-150
Listserv query, week four (n=27)	27	10 & 20 (5)	24.51	4-120
Reading, week five (n=23)	85	45 & 90 (5)	44.44	30-180
Online tutorials, week five (n=26)	89	90 & 120 (6)	45.64	20-210
Listserv query, week five (n=22)	29	15 (5)	41.40	4-170

- use of high order cognitive skills,
- demonstration of understanding,
- or self-assessment of understanding.

Students who assessed the online tutorials as useful, because the exercises clarified information provided by the text, wrote comments such as:

- “Having the exercises to do after the readings helps me to understand and pick out the important parts of the readings.”
- “Without doing the online exercises I would not be able to understand the chapters.”
- “The passages about group communication were insightful. What do you know, I’m actually learning something from this!”
- “I needed extra practice since a lot of information was covered.”
- “It gave me a good overview of the readings, helping me put the ideas in perspective.”
- “They [the online tutorials] helped by providing some clues.”

Multiple passes through the text, though often viewed as “time consuming,” even “too time consuming” by a few students, were generally perceived as beneficial. One student wrote about the tutorials, “They helped me comprehend the ideas from the reading and required me to look over the book, over and over again.” Another student confessed the tutorials “refreshed my memory” and made him go back to answer questions he “couldn’t figure out.” He added, “I learn more by going back.” Finally, a student reviewed the tutorials as

useful because “the exercises went along with the chapters. If you read the chapters, it made the exercises a lot easier.”

Use of high order cognitive skills may not have been a benefit students commonly remarked upon, but one student wrote, “I found that some of the exercises were difficult and required some thinking, but they were very interesting and not too hard.” Students were required to demonstrate understanding of concepts covered in the text, perhaps why students found multiple passes through the material necessary. But demonstration of understanding is a difficult task, and the exercises may have seemed too time consuming as students wrestled with these demonstrations.

“Anyone can read it. But to truly understand it, one must use it,” wrote a student on the theme of demonstrating understanding through application. The exercises, according to some students, “make you really use what you read.” A benefit of realistic practice, the exercises “made the reading in the chapters more real,” for a student who found the work time consuming (120 minutes during week three). Another student, finding the online tutorials useful in processing the reading assignments, wrote, “I like to work with information I have learned so I understand it more.” A male student suggested that the online tutorials helped him assess what he understood, providing insight that students might have found the tutorials useful in deciding when they have learned or studied enough to meet course objectives.

From a completely different angle, one student wrote the book helped him understand the tutorials. Finally, a student wrote this comment on her

assessment form, "They [the online tutorials] were great fun!" Entertainment was not a stated course objective, but this could reflect satisfaction of a student-centered objective, perhaps one that should have been accommodated.

With 14 percent of assessments representing negative evaluations of the online tutorials, these general themes were noted: information in text and/or tutorials was too complicated, the exercises were too time consuming, or the text and exercises were repetitive. One student wrote, "I found that the exercises were very confusing. The wording was what I found hard to understand." Two other students indicated they already had such well-developed skills in the area covered by the reading assignments and tutorials, the work was not useful to them.

Did the course work take "too long"? If the class had met in the regularly scheduled time frame, using a traditional teaching format instead of online tutorials, the class meetings would have taken 2 hours, 30 minutes per week. The course would have relied on reading assignments and according to student reports, that would have added 15 minutes to 3 hours of time per week to the course, or a mean average of 75 minutes (Table 10). The total for such a format, then, would have been 225 minutes average per week, with the online tutorials and listserv questions completed during class time (though some students would have difficulty completing the assignments in that time frame).

Compared to the estimated total time spent, based on a mean of reports, the students were engaged with course materials approximately 45 minutes less per week using the online course delivery system (with an average total of

Table 10

Time Spent Records: Totals by Assignment Type

Assignments	Mean (minutes per week)	SD (minutes per week)	Range (minutes per week)
Reading assignments	74.88	40.45	15-180
Online tutorials	82.51	37.18	20-210
Listserv assignments	24.62	29.58	4-170

approximately 183 minutes). Indeed, the means of the tutorials and the listserv activities (107 minutes average) would total less time than the class schedule would have (150 minutes total), but the means do not represent those students who would rapidly complete the tutorial and listserv assignments in a classroom setting (the lower edge of the range was 24 minutes), nor accommodate those students who required more time to complete these assignments than the class schedule would have allowed (the upper edge of the range was 380 minutes).

Barriers Encountered

Barriers encountered were garnered from reports by the instructors, course e-mail, and student assessments. The identified barriers were categorized in the following manner:

- equipment failure, including
 - ✓ server crashes,
 - ✓ online exercise submission failures,
 - ✓ lost or misplaced e-mail,
 - ✓ and the need for printing hardcopies as backups;
- inadequate software, including
 - ✓ lack of dynamic interaction and feedback,
 - ✓ lack of password protection,
 - ✓ lack of computer-mediated analysis of results,
 - ✓ inability to connect,
 - ✓ and difficulty in reading reports;

- inadequate teacher preparation, including
 - ✓ knowledge of software,
 - ✓ and knowledge of Internet copyright issues;
- inadequate resources, including
 - ✓ support from computing services,
 - ✓ administrative support,
 - ✓ colleague support,
 - ✓ and marketing services;
- human error;
- time inefficiency;
- and lack of spontaneous interaction.

Equipment failure. While periodic server downtime was to be expected, a dramatic crash occurred during the five-week online session that almost spelled disaster for this dissertation. The main server, handling e-mail and all e-mail related files for each account at the college, failed and was replaced. A backup of all files was available, but for approximately one week, computing services personnel were not certain the backup files would be available when the new server went online. The crash occurred just hours before one of the weekly deadlines for assignments, so several students were caught by the unexpected and complete server failure. The professors made a few changes in the schedule, accommodating student need for more access time. If the backup files had been lost, the data for this dissertation would have been compromised and

the records of student performance would have been unavailable for grading purposes.

Due to these equipment problems, and human error, all students were encouraged to print their online exercises before they submitted them. The professors were also responsible for printing hardcopies of the responses. This resulted in an estimated 2,000 sheets of paper printed for this course. The time spent printing these copies was not calculated, but the inconvenience of this necessary activity was annoying enough to generate several comments from both professors, as well as a few students. In addition to these problems associated with printing, we often ran into printing hardware failure.

Summing up the failure of hardware, a student stated, "I was a little frustrated at first. The computers don't always work right. I had to learn to adjust to that."

Inadequate software. While students did not mention a lack of dynamic interaction, I felt the enthusiasm for interaction could have been enhanced with more dynamic interaction. For instance, instead of sending students to a facility with crowds of people, with an assignment in interpreting nonverbal communication (Appendix C, "Exercise E," question number 2), we could have developed a digitized video presentation and asked for student evaluation of that human interaction. This would only be possible with appropriate Web-page generation software and software specifically designed for building online courses.

Students did comment on a lack of knowing how their course progress was rated in relation to expectations and other students, as well as how well they were doing on the tutorials, in particular. "I hope I did the assignment right," is a simple call for feedback. E-mail to the students each week, telling them what had been received, helped alleviate the confusion about achievement, but students may have benefited from a report they could access at will, rather than waiting for the professor to contact each student individually (which negatively affected time efficiency). The professors did not have time to comment on the quality of each individual e-mail (receiving at least 100 each week, typically within a 24-hour time period), but students could have benefited from that feedback.

When the decision was made to change textbooks for this course, care was taken to avoid unfair use of copyrighted material. I contacted the publisher of our textbook (McGraw-Hill) to gain permission for use of the textbook in materials placed online. They requested compliance with password protection, strictly limiting access to the materials. However, our computing services staff notified me that we did not have appropriate software to provide password access to our Internet-based course. We notified the publisher that we were not planning to connect the course page to any other pages on our server, forcing students to type in the course address each time they sought access (the "bookmark" feature on computers in our computer lab was regularly erased). This maneuver was adequate for this case study, but would not be the method of choice to maintain adequate legal protection for copyright infringement.

Appropriate software allows the computer to score student responses and to provide programmed feedback. Both professors felt the computer should be utilized more thoroughly, providing time efficiency gains, following the recommendations from researchers in computer-based instruction (Crosbie & Kelley, 1993).

Throughout the five weeks, students periodically complained about a failure of exercise submission protocols (the professors did not receive their completed assignments). We were often unclear about the cause for these failures. In many cases, the online exercises did go through (were received by the professors), but the students did not see the communication page that told them the exercise was properly submitted through the e-mail system. This confusion lengthened the time students spent online. Frustration was high from students having problems with submitting their work, "I have tried to send it and I get some weird screen after it about generic mail. [Another student] is in our class and he tried to help me and he could not figure it out either. I have tried to send it twice and it is not getting through, I guess. What should I do?"

Frustration was also high with failure to connect to the pages so students could begin their work. Even with careful typing or cut-and-paste treatment of the Web page address, the connection to our course page often failed, particularly from off-campus computers. My dissertation committee members had difficulty connecting to the online course pages from off-campus locations and students wrote messages such as, "I have been having trouble getting into the online

class. . . I got through to it earlier this week, but yesterday afternoon and today when I type in the address it tells me that there was an error in the connection and somebody may be trying to fix the system or it is down [the server was not down during this time period and no authorized personnel were working to "fix" pages]."

The responses from students came through e-mail in one of two formats. In the preferred format, student responses to questions appeared on one (or more) lines per question. In the second format, the student responses appeared together in paragraph arrangements, with no punctuation between sentences. This format was extremely difficult to read and lengthened the time spent on analyzing student responses.

Inadequate teacher preparation. The professors for this class felt they were inadequately prepared for online instruction. The professor for section two of the course had not taught this particular topic before, had not presented a class online before, and was not familiar with course development software. In preparation for this course, she read the proposal (chapters one through three) of this dissertation and felt she understood the theoretical foundation for course design. She did not feel comfortable, however, with the Web environment, the Web pages, nor the computer e-mail system.

Before the class began, I thought I was adequately prepared to develop the course and to utilize the selected software. However, my lack of knowledge in at least two areas negatively affected time efficiency. I created a communications page, including a listserv system, for each registered student.

The college had disconnected the Web browser's e-mail feature in all public computers, so students were frustrated to learn they could not use the communications page unless they were working off campus. The listserv had to be updated on average four times each week, to accommodate changes students made in their course schedules (dropping and/or adding this course) and incorrect e-mail addresses. The computing services staff wrote, "Don't presubscribe students – make them subscribe themselves (just make sure your instructions on how to do so are precise – you'd be surprised how many erroneous combinations students use when trying to subscribe!)."

I did not know that leaving a Web page by utilizing an embedded link, then returning to the original page with another embedded link, would erase all of the answers students had already put in. In fact, I was encouraged to make these links by computing services staff, to provide several linkages for students with perhaps inadequate Internet browsers or insufficient knowledge to use the "back" button on the browser we utilize on campus. However, after students complained about a loss of their work, we received this note from computing services personnel, "This is normal for most form Web pages. Students can go to the file and open a new Web page window to search for information and keep the form window open in the background. That way, the form information is not lost." We made corrections to the information students had available to them and corrected this problem about midway through the online tutorials.

Knowledge of Internet copyright issues became an issue during this case study. The college created an online education committee in response to the

development of this course. The goal of the online education committee was to investigate intellectual property issues, quality online course parameters, Internet copyright issues, and to make recommendations about these topics to college administrators. During this committee's investigation, we determined this course developer had inadequate training in the area of copyright protections and may not have been in compliance with fair use guidelines for use of copyrighted materials online.

Inadequate resources. Resources available at the college appeared to be inadequate for effective and successful online course development. First, many of the software, hardware and preparation issues faced could have been avoided with ample support from computing services. The personnel were certainly willing to be of service, but the computing services department is so over-worked, they did not have time to be proactive in their help. They could only wait for problems to develop and then respond to those problems as time allowed. Further, the software currently owned by the college was not conducive to minimizing the administrative tasks necessary to run the course time-efficiently. The college also had no personnel who were familiar with adequate software packages, such as Authorware.

Administrative support is also necessary. During the development of this course, the president and several other key administrators were replaced. The new administrative body was more aggressive in developing online courses and began several initiatives at the college that would allow development of more courses. These changes included creation of an online education committee,

hiring a distance education director, and building a partnership with a corporate sponsor for future online education opportunities.

Having colleague support may not appear to be a prerequisite for developing online courses, but the professors for this course discussed that issue. They felt the opposition of their colleagues lead to a less than optimal atmosphere for effective development of such courses. One professor cited an incident involving a student who had been told by another professor that the online course wasn't really education, but "playing around" and hardly better than a correspondence course. This kind of interaction could lead to student dissatisfaction with the course and could be a threat to effective learning.

Marketing services were not available to the professors for this course, other than the standard marketing practices engaged in by this college. Adequate marketing services would have attracted students to the online course who wanted to take such a course and would have prepared all registered students for the fact that their course was partially online. The instructors noted that many of their students had no prior knowledge that they would be completing the course online and none indicated they had taken the course because it offered the feature.

Inadequate resources must also include comments from students about a lack of access to computers that connect to the Internet. Many of this college's students were residents of the college residence halls. All have access to computer linkage, but some students did not have computers of their own. The labs were sporadically used for classes and were not available during those

times, and the labs were not open 24-hours a day. Putting computers into the residence halls or into the hands of each student through an automatic computer purchase program could have resolved the lack of computer access.

Human error. While most online exercises were submitted properly, both professors had trouble a few times with inadvertent loss of e-mail (deleting the student's responses from their files). These misplaced files were not always recoverable and students had to either produce their printed copies or resubmit the exercise.

On occasion, some students maintained they had not received the listserv query for the week, even though the professor's files indicated the query was received by all students. Inadvertent deletion may have been a problem here, but in at least two cases, we found human error (incorrectly adding the names to the listserv addresses) caused the failure and once a server malfunction caused the missing e-mail.

I made two typing errors, one caused the student responses to an exercise to be mislabeled so confusion developed about which exercises were completed on time. The other typing error caused two exercises to be complete duplicates and the students had to wait a day while I corrected the problem. Testing all online pages, to determine that all e-mail links were operating correctly, would have been a prudent step.

Human error was not limited to the professors. Several students neglected to put their names on their online exercise responses and when they used public-access computers, we could not always tell who submitted the

assignment. In addition students often became confused about the exercises they had completed, submitting more than one response to an exercise. They also submitted exercises more than once when they were unsure if the submitted work had been appropriately received; one such incident resulted in 15 copies of the same exercise through e-mail. This redundancy decreased time efficiency for both the student and the professor.

Time inefficiency. The amount of time needed to develop the online course, with no prior experience, was daunting. My journal indicates I spent 500 hours developing the Web pages (over 30 Web pages were used for the course) and an equal amount of time analyzing the student responses for correcting and improving those pages. The next use of the material may not require as much time, so time efficiency could dramatically increase with course use. However, maintenance of the course Web pages will continue to make demands on the instructors and significant changes in the course design, such as employing a more powerful software program, will require more time commitment from the instructors.

The professor for section two of the course complained that reading all of the online exercise responses seemed much more burdensome than class interaction. She added that perhaps this was in part due to her “techno-phobia” and she allowed that practice with online instruction will diminish demands on her time. We also concurred that use of a software program that allowed for computer-mediated analysis of student responses would help tremendously.

Lack of spontaneous interaction. The listserv query and e-mail system did not encourage students to contact the professors often for specialized help during the online course. One student wrote, "This is fine with me, except sometimes I wish I had the teacher to help out with the reading." The instructor for section two of the course wondered if the students were somewhat intimidated by the listserv system and perhaps the students were not comfortable assessing each other's work in writing (such as the exercise they were asked to perform with the fourth listserv query). Both professors also indicated dissatisfaction with the number of exercises the students completed overall, believing the prompts were not sufficient to encourage more course interaction. Would students have completed more exercises with face-to-face interaction? The collected data did not address this question. A student wrote, "For a person like me, who would rather speak in person than on the phone, this over the computer stuff is the most unpersonal [sic]. I realize and understand the convenience and necessity [of the online format] for others. But I can learn a lot more in a live conversation with an instructor and students."

Benefits Encountered

Benefits encountered were extracted from course e-mail and assessments by instructors and students. The course e-mail revealed no benefits, with all comments regarding either computer malfunctions, software problems, or confusion about completion of assignments (not how to complete assignments, but if assignments were completed on time).

The assessments by students did reveal benefits from the online format of the course, as did the assessments by the two instructors. Benefit statements included these general categories: entertainment value, learning value, convenience, developing computer skill, developing Internet skill, and developing student responsibility.

Entertainment value. Several comments fell into the entertainment value category, using words such as “fun” or “this class is great” or “it is real fun doing these exercises and working with class by responding to questions.” One student combined the concept of “fun” with the value of learning with these words, “Some of these exercises are very fun and really make you think about stuff you never really paid attention to. I also have a better understanding of ways of communicating and all the fancy terms for it.” Entertainment value was not a consideration when designing this course and the software employed to create the tutorials was not powerful enough to develop complex, animated tutorial design. This researcher was concerned that students would find the tutorials too simple, the design too basic and unappealing. No comments were found in the data to suggest students had the same concerns. This researcher also found the experience “fun,” but the other instructor found the experience so frustrating she did not intend to utilize the online format in future classes.

Learning value. Students did have expectations for learning that were apparently satisfied, at least for some. Comments included, “It’s been a lot of work, but it has been [a] good learning experience.” This category only includes general comments about learning, rather than comments that referred specifically

to skill development. Even when students felt the course was too time consuming, they often included comments such as, "It does take a lot of time to complete the assignments, but I am learning a lot," which indicates a positive assessment for time efficiency. Another student wrote, "The idea of out-of-class exercises is very effective and if there is any [consolation], I think this type of learning is very effective, plus the fact that if we have problems we can still ask for the instructor's support. Just beautiful."

This instructor was convinced that learning took place and that test performance was at least as satisfactory as classes conducted in a traditional setting. The other instructor was not as convinced, "We had too many exercises and too many questions. How much did the students learn?" She also commented on the quality of interaction from the students, but added, "Would we care about the level of their communication skills by e-mail, for instance, if we didn't teach English? Are we expecting too much? We didn't express our standards for performance in the beginning of class. This [e-mail] was an informal writing situation, too." The students, however, commented on the need to learn more about e-mail as a communication tool and the opportunity to practice their skills, which implies at least one reason they found the online experience useful.

Convenience. Student satisfaction with the online format was frequently based on convenience. Students specified the convenience of time, scheduling, and working alone. "So far it [the online format] has been pretty handy," one student wrote, "I wish I had a few more classes on the Internet." Another student

commented, "I enjoy doing work on my own using the computer, rather than sitting in a classroom."

The instructors also found the asynchronous format flexible and convenient. The only drawback to the online schedule was the student tendency to put off exercise completion until the final hours each week. For the professors, the influx of so many e-mail messages was "a nuisance and just something else I have to take care of, just another responsibility." Having the class time to use as appropriate was advantageous generally and having the opportunity to hear from each student was also convenient: "There's less hiding out this way. In the classroom students can hide out, avoiding participation, but not online."

A student wrote, "[This is] the best course I ever took OR I am happy I don't have to show up three days a week!"

Developing computer skill. One of the stated objectives, computer skill development not only serves the students well while in college, but will hopefully prepare them for a successful career. Some students do not readily embrace this objective however: "I hate working on a computer, but it makes the work easier . . ." Another student indicated awareness of his developing computer skills with, "The computer is a little tricky at first, but I think I am getting it." Another student wrote, "It is fun to do the assignments on the computer, and it also helps me to learn about the computer." Taking this theme up, one of the female students stated, "I think it [the online format] is a good idea, it not only teaches you something about your textbook, but it teaches you computer skills, which everyone could use some practice on."

While I had many years of experience working with computers, I gained software knowledge with this experience. The other professor, however, suggested that she gained a great deal of knowledge working with the computer and with software that was unfamiliar to her. "I'm still a techno-phobe, but I'm getting more used to working with computers!"

Since most students indicated on the orientation exercise that they were able to send e-mail (16 of the 33 respondents indicated "5" or "that's me" as a response to "I know how to send e-mail"), the instructors anticipated few problems with the e-mail requirements for responding to listserv queries. However, 17 students indicated room for growth with the e-mail system and assessments from students indicated that growth occurred through this online course. Most students indicated they did not know how to use a listserv system (twelve students indicated "1" or "not even close to describing me or my situation" in response to the statement, "I know how to use listservs"), but a majority of students responded to each listserv query.

Developing Internet skill. Only one student mentioned the Internet, saying that learning Internet skills was a benefit of the course. In fact, the students only gained a brief connection to the Internet, by typing the address for the course homepage and using embedded page links thereafter. This course could be modified to build on this concept, encouraging students to seek hypertext links on a variety of subjects, but that was not one of the course objectives.

The orientation exercise did seek to establish student prerequisite skill for using the Internet ("I can get on the WWW and do simple searches"), but no

activities required students to do such a search during the online portion of the class. The listserv query on e-mail did not require students to conduct a search for information, simply to type in the Web page address provided. This orientation request would indicate that students might need help with conducting searches on the Internet, but the online course requires modification to enhance this skill.

Developing student responsibility. Forcing students to take responsibility for their performance was an underlying, if not stated, objective of the course. Moderate external pacing was utilized, following the guidelines from research (Belland et al., 1985; Glick & Semb, 1978; Merriam, 1988; Reiser, 1984). Students may not be prepared for taking on this responsibility and that could account for the less than satisfactory online exercise completion rate. In fact a student wrote, "I really like it [the online format]. It is [a] different setting than a regular classroom, but it puts more responsibility on us to make sure it [the work] gets done." And another student stated, "It is hard to remember to get this done by Fridays without pre-planning when I will do it." Effective time management skills were not part of the objectives, but students may have experienced a need for developing such skills to complete the online exercises within the specified time frame. The instructors determined that completion of the exercises lacked motivating contingencies and planned to alter the moderate external pacing procedures to encourage more participation in future online courses.

Chapter 5

Summary, Conclusions, Discussion, and Recommendations

Overview of Findings

This case study of a college course delivered online sought to answer these questions:

- Can online (computer-assisted) college instruction, using theoretically sound instructional design, provide rich instructional interaction without sacrificing time efficiency?
- Using the Bourne et al. (1998) paradigm for online instruction, how did participants interact with the course?
- What was the range for time-efficiency with the selected paradigm and how did participants evaluate time spent?
- What were some of the barriers encountered with online instruction?
- What were some of the benefits encountered with online instruction?

Addressing these questions, the results were organized around a) a description of course/student interaction, b) an examination of the depth and breadth of interaction achieved, c) an evaluation of time efficiency and whether that time was well spent, and d) an exploration of barriers and benefits encountered with online instruction.

The description of course/student interaction indicated this online "Principles of Communications" course took approximately five weeks (one-third of the semester) for 39 participating undergraduates to read a majority of the selected text and complete 14 online exercises (an orientation exercise and 13

tutorials), four listserv assignments, and two online tests to enhance learning. These online activities were all interactive, where students responded to questions and submitted their answers to one of two college professors through the college's Web-based e-mail system. To provide feedback, the professors utilized the college's network e-mail system, informing students of their progress on exercises as well as the estimated quality of their answers.

The examination of depth and breadth of interaction revealed a tendency for students to be brief, often "superficial" according to the professors, and to wait until the final hour before the deadline to submit their work. Because the professors often received more than 100 e-mail messages within four hours, the possibility of immediacy in feedback was eliminated and the promise of asynchronous course participation was defeated. Numerous typing, spelling and grammar errors denigrated the quality of student responses, as did a lack of clarity. The Web-based e-mail system also added several codes and provided irregular line breaks, which further decreased readability of student responses. A lack of adequate contingencies may have contributed to the low number of student responses on any specific exercise, but a failure to relate to student experience or interests may also have contributed to this rate of response. Students tended to refer more to personal experience than to reading assignments when answering questions, but that was not inappropriate for some of the queries. The self-assessments of computer literacy, provided on the orientation exercise, indicated evidence of low confidence for many students, although remedial intervention was required by very few. The self-assessments

of content literacy indicated evidence of high confidence for many students, although performance levels suggested that confidence was misplaced for many students.

The queries ranged in quality, which likely resulted in the range of quality in responses. Some questions followed Markle's (1990) guidelines for response requests, while others followed guidelines provided by Rothwell and Kazanas (1992). While some queries required a low level of cognitive involvement (recognition and/or recall responses), others required fine or gross discrimination skills. Determining the quality of responses was highly subjective and time-consuming and the professors involved in this case study were planning to continue revising the online course to eliminate queries that produced responses which could not be assessed by the computer software. Using Henri's (1991) model for interactivity, the study revealed that 94 percent of the responses to weekly listserv queries were indirect responses.

Two online tests were completed by approximately two-thirds of the students, which was an unsatisfactory level of involvement, according to the professors. The accuracy level on these two tests, for the students completing them, represented a typical range of "As" (90 percent or better correct) to "Fs" (less than 60 percent correct), with the majority of students clustered at or near 75 percent correct.

An evaluation of time efficiency and whether that time was well spent suggested that students generally found the online course useful and efficient. Student evaluations of time spent fell into these general positive categories:

online exercises offered clarification of the text, required multiple passes through the text, relied on higher order cognitive skills, required a demonstration of understanding, or forced students to self-assess understanding. Just 14 percent of the evaluations were negative and these assessments fell into the following categories: the interactivity was too complicated, too time consuming, or unnecessarily repetitive. This online course took slightly less time than a traditional approach would have taken (for students), but this does not account for students who reported times spent outside the mean (the mean was 183 minutes total spent per week on all course activities, with a range of 24 to 380 minutes).

An exploration of barriers encountered with this online college course included these deficiencies: equipment failure, inadequate software, inadequate teacher preparation, inadequate resources, human error, time inefficiency, and a lack of spontaneous interaction. An exploration of benefits encountered with this online college course included these attributes: entertainment value, learning value, convenience, development of computer skills, development of Internet skills, and development of student responsibility.

Findings Applied to the Theoretical Framework

A synthesis of the theories addressed in this case study's literature review garnered 56 guidelines for effective instructional design. This framework was utilized to develop the online course used in this case study and the findings can be reflectively applied to that framework.

Preparatory functions. The theoretical framework for this case study

included these prerequisites for effective instructional design:

1. Identify the instructional need (Markle, 1990).
2. Conduct a task analysis (Markle, 1990).
3. Identify clear, written instructional objectives (Mager, 1984; Markle, 1990; Rothwell & Kazanas, 1992).
4. Match objectives to criterion tests used to measure accomplishment (Markle, 1990).
5. Account for and accommodate (when feasible) learner objectives (Bunderson & Christensen, 1995; Markle, 1990; Scardamalia et al., 1989).
6. Provide pretesting and/or advance organizers (Belland et al., 1985).
7. Prepare instructor(s) adequately to teach with selected methodologies (McCombs, 1985; Shoemaker, 1998; Wolcott, 1991).

The online course was designed to accommodate all of the preparatory functions of identifying an instructional need through providing advance organizers. The findings, however, suggested that adequate instructor preparation was not accommodated. The learning curve for appropriate online course design software is significant and a lack of instructor preparation not only increases time inefficiencies, but may add to student frustrations while interacting with poorly constructed online pages. Inadequate preparation could also lead to serious ramifications for a college that inadvertently violates copyright laws. Intellectual property issues also pose a serious threat when colleges fail to address policies and procedures before intellectual property disputes arise. Instructor preparation might also encompass the preparation of the college community, providing optimal resource and collegial support for the online course participants. When non-participating professors and students denigrate the online experience, the resulting atmosphere can threaten the viability of the learning experience. Failure to provide persuasive marketing support for the

online courses further erodes the environmental integrity of such courses, as does the failure of a college to provide adequate instructional resources, such as computer access.

Teaching tactics. The theoretical framework yielded the following nine teaching tactics for sound instructional design:

1. Identify all necessary prerequisites (Bunderson & Christensen, 1995; Overbaugh, 1994; Markle, 1990; Sfondilias & Siegel, 1990).
2. Encourage working in dyads where feasible (Kelly & O'Donnell, 1994).
3. Encourage cooperative learning in small groups where feasible (Bourne et al., 1998; Cuseo, 1996; Kelly & O'Donnell, 1994; Porter, 1998; Pugh, 1993; Scardamalia et al., 1989).
4. Where feasible, match instructional strategies to student skill and experience (Belland et al., 1985; Gau & Madison, 1993; Ross et al., 1985; Scardamalia et al., 1989).
5. Encourage a higher level of cognitive processing where feasible (Evans et al., 1962; Markle, 1990; Overbaugh, 1994; Pritchard et al., 1989; Scardamalia et al., 1989).
6. Encourage dialectical thinking where feasible (Pugh, 1993).
7. Encourage inductive, deductive, and abductive reasoning (Shank et al., 1994).
8. Utilize procedural facilitation where feasible (Grabe et al., 1990; Merriam, 1988; Scardamalia et al., 1989; Steinberg, 1989).
9. Encourage discrimination learning, concept formation, problem solving and knowledge transfer where feasible (Brothen, 1991; Casey, 1996; Culmer, 1997; Dempsey, 1986; Derycke, 1991; Jacobson & Spiro, 1995; McCombs, 1985; McNergney & Hinson, 1985; Miller & Weaver, 1976; Overbaugh, 1994; Scardamalia et al., 1989; Sfondilias & Siegel, 1990).

The findings suggested that all prerequisites were identified and that students were more comfortable working with the course if they had had some prior experience on the Internet. The college in this case study considered this course a sophomore level course and freshmen were required to complete an introductory computer course. This is an informal course prerequisite that was met most of the time, and the orientation exercise helped to locate students who felt inadequately prepared to handle the online requirements of this

communications course. As Markle (1990) suggested, instructors must be prepared to accommodate all prerequisites that are not met. The professors in this case study were apparently prepared to make necessary accommodations. However, no effort was made to determine why some students dropped the course after the first day and some of those students could have dropped the course because they were worried about having to take the course online.

Working in dyads or small groups was not encouraged in this case study of online instruction and those teaching tactics could be examined in future research. The professors in this case study were somewhat dissatisfied with the level of higher order thinking skills demonstrated by the students and revision of the queries and feedback systems will be employed in future courses to gain more quality in student responses. Procedural facilitation was not utilized well in the case study, due to inadequate teacher preparation, inadequate software, and, perhaps, inadequate learner preparation. The other teaching tactics were followed where feasible in this case study.

Research guidelines for matching instructional strategies to student skill and experience (Belland et al., 1985; Gau & Madison, 1993; Ross et al., 1985; and Scardamalia et al., 1989) were supported by the findings in this case study. First, most of the students had experience on the Internet and most of the students found this online experience to be quite positive. Also, when students found a query directly related to their current circumstances, the quality of responses increased.

Content maneuvers. The theoretical framework for this case study

provided the following content guidelines:

1. Cover all objectives with content (Markle, 1990).
2. Include content that is related to objectives, the task analysis, and/or the instructional need (Markle, 1990).
3. If tangential content is included, communicate relative importance of it (Markle, 1990; Overbaugh, 1994).
4. Use programmed instruction where feasible (Kulik et al., 1980a; Markle, 1990; Miller & Weaver, 1976).
5. Empirically test content to determine if the amount of information provided is sufficient to promote mastery for performance at selected standards (Markle, 1990).
6. Provide an adequate range of examples in content and practice items to promote concept formation (Markle, 1990).
7. Provide sound subject matter (Markle, 1990).
8. Adapt content to student skill and experience where feasible (Grabe et al., 1990; Wesley et al., 1985).

The nature of this course readily allows for adaptation of content to student skill and experience, since this course is concerned with the overall human communications experience. All of the content maneuvers were accounted for when the course materials were constructed. The use of programmed instruction, however, was only moderately employed with the use of Web authoring software that was not designed to foster programmed instruction. Upgrading the software from a simple Web authoring tool like Claris Homepage to a sophisticated instructional design program like Authorware should correct this problem. However, time efficiency will be affected by a significantly increased learning curve, and reliance on college resources, such as trained personnel and powerful computer hardware, may increase dramatically with the move to more sophisticated software.

Presentation logistics. The theoretical framework presented the following presentation logistics for sound instructional design:

1. Present content in necessary logical sequences (Markle, 1990).
2. When logical sequencing isn't required, present content and interactive exercises with non-linear connections where feasible (Cordell, 1991; Jacobson & Spiro, 1995; Landow, 1992; McNergney & Hinson, 1985).
3. Encourage non-linear investigation (student directed) where feasible (Cordell, 1991; Culmer, 1997; Jacobson & Spiro, 1995; McNergney & Hinson, 1985; Porter, 1998).
4. Follow the principles for skillful writing and clear communication (DeJoy & Mills, 1989; Markle, 1990).
5. Convey meaning of significant information through good design (Green, 1998; Markle, 1990; Porter, 1998).
6. Reduce load on memory to a necessary minimum by design and "chunk" material appropriately (Greene et al., 1994; Markle, 1990; Porter, 1998).
7. When using animation, keep to necessary and efficient visuals (Park, 1994; Rieber et al., 1990; Rieber, 1996; Sawyer, 1988).
8. Provide adequate support technicians and resources from host institution (DeJoy & Mills, 1989; Porter, 1998; Shoemaker, 1998).
9. Protect student privacy (DeJoy & Mills, 1989; Porter, 1998).
10. Protect program from unauthorized use (DeJoy & Mills, 1989; Porter, 1998).

The course design utilized in this case study presented content in a logical sequence determined by the textbook, which was not necessary. The exercises followed the chapters in sequence and students were instructed to complete the online tutorials in that sequence, even though non-linear connections were feasible. Students, as far as the case study could reveal, did not engage in non-linear, self-directed investigations. This finding complements the conclusions reached by Culmer (1997), "Too many studies, including this one, indicate that students will not learn and use a technology when no perceived necessity exists for them to do so" (p. 120). Culmer suggested making Internet use mandatory as part of the course and the experience described in this case study reveals that students may not pursue non-linear connections even when instructed to do so.

Therefore, the theoretical framework should include another guideline: Provide adequate contingencies to encourage non-linear investigation where feasible (Culmer, 1997).

The principles for skillful writing and clear communication were followed by the instructional designers, but students did not utilize these same principles in their responses. The course might have been improved if students had received instructions to communicate clearly and future research is recommended to address this issue. What prompts do students require to successfully improve their own communications? While Markle (1990) advocated avoidance of paraphrasing and student-constructed answers (in part to avoid unnecessary "busy work"), this researcher chose to encourage student-constructed answers to provide effective communication skills practice. Achieving effective communications, however, appears to require more than just the opportunity to practice.

Protecting student privacy did not appear to be a problem in this course, as students understood prior to engaging in the listserv queries that all students in the class would see their responses in those exercises, but would not see the student responses for online tutorials. Privacy violations did not appear in the case study. However, protecting the program from unauthorized use was a problem, since the college lacked software that allowed for password protections. The online course is simply placed on the server with no links to any specific Web page, so connection to the pages became possible only with the appropriate "http" address. This was so effective, in fact, that even some

authorized personnel, including members of this researcher's dissertation committee, could not access the online course pages from off-campus computers. Unauthorized access was not detected during this case study.

Interactive strategies. The theoretical framework for this case study provided the following guidelines for interactive strategies:

1. Use response requests which relate directly to objectives (Markle, 1990; Pritchard et al., 1989).
2. Require interactivity (Pritchard et al., 1989; Sawyer, 1988).
3. Require interactivity that is overt and active (Kritch et al., 1995; Markle, 1990; Scardamalia et al., 1989; Tudor & Bostow, 1991).
4. Utilize moderate external pacing where feasible (Belland et al., 1985; Glick & Semb, 1978; Merriam, 1988; Reiser, 1984).
5. Maintain efficiency with interactivity (Grabe et al., 1990; Markle, 1990; McMinn & Foster, 1991; Wesley et al., 1985).
6. Empirically test interactivity to establish if practice provided is sufficient to achieve mastery for performance at selected standards (Hannafin et al., 1986; Markle, 1990; Overbaugh, 1994; Shank et al., 1994).
7. Provide feedback where feasible (Dempsey et al., 1993; Markle, 1990).
8. Provide correct responses and KCR where feasible (Clariana, 1990; Dempsey et al., 1993; Markle, 1990).
9. Provide elaborative, but efficient, feedback where feasible (Gilman, 1969; Kulhavy et al., 1985; Kulhavy, 1977; Markle, 1990; Noonan, 1984; Roper, 1977; Scardamalia et al., 1989; Waldrop et al., 1986).
10. Provide immediate feedback where possible (Hannafin et al., 1986; Howard, 1987; Kulik & Kulik, 1988; Martin & Bramble, 1996).
11. Provide positive feedback where possible (Pritchard et al., 1989; Scardamalia et al., 1989).
12. Present feedback with non-contingent, but efficient delay to encourage processing (Crosbie & Kelly, 1994; Howard, 1987).
13. Foster performance realism when possible (Overbaugh, 1994; Ross et al., 1985).
14. Provide performance reports when possible (Kiesler, 1991).
15. Record the number of error responses during interactivity to monitor and evaluate interactivity and communication (Dempsey et al., 1993).
16. Adapt number of response requests to student performance where feasible (Dempsey, 1986; Litchfield et al., 1990; Steinberg, 1989).
17. Encourage reflection with response requests (Scardamalia et al., 1989).
18. Encourage multiple passes through content with response requests (Scardamalia et al., 1989).
19. Identify conceptual hierarchies and use interactivity to require learners to process the relations involved (Markle, 1990).

20. Provide an adequate range of examples in response requests (and content) to encourage concept formation (Markle, 1990).
21. To promote efficiency, allow the computer to conduct administrative tasks (like providing feedback and scoring interactivity) wherever feasible (Crosbie & Kelly, 1993).
22. Maintain a higher level of cognitive processing with response requests, using RULEG (inquiry learning) where feasible (Evans et al., 1962; Markle, 1990).

The response requests used in this case study appeared to relate directly to the objectives, according to the instructional designers, but these relationships did not appear clear to some of the students. The low level of assignment completion could have been at least partly caused by a lack of perceived need or connection to the course objectives, following the conclusions Casey (1996, p. 81) referred to when learners reacted negatively to hypertext connections if they lacked a "cognitive organizing framework." An additional interactive strategy for the theoretical guidelines could be: Distinguish relationships between response requests and instructional objectives through sound instructional design.

The interactivity in this case study was required, overt, and active, as well as moderately externally paced. Crosbie and Kelly (1993) described a personalized system of instruction which required "each unit must be mastered before a student can proceed" (p. 366) and that may have solved the problem of exercise completion level, which was low enough to cause the professors involved some concern. Contingencies built into the course were not sufficient to maintain preferred levels of completion and that should be an additional interactive strategy: Provide adequate contingencies to require mastery of each unit before allowing a student to proceed.

Efficiency in response requests was sacrificed in this case study to allow practice of effective communication skills. However, the professors were not satisfied that effective communication skills were adequately achieved, so the sacrifice appeared to be in vain. Perhaps providing appropriate prompts for effective communication, as well as maintaining efficiency in response requests wherever feasible would improve this online course. In any case, another addition to interactive strategies is: Require effective communication in student responses where feasible.

This case study was pre-tested to insure that interactivity and practice were sufficient to achieve performance at selected standards; however, that performance level was somewhat dependent upon completion of all exercises. Feedback was provided where feasible and where time allowed, which was not as often as preferred by the professors involved. The software was inadequate to provide for correct responses and KCR, nor could the feedback be immediate. The professors provided elaborative feedback as time allowed, but as demands on their time increased, the elaborative feedback became more group-oriented and less individual-student-oriented. The feedback was positive where possible. Feedback was not presented with non-contingent delay to encourage processing, in fact the professors could not even detect if the students read the e-mail feedback (the e-mail system used by this college only indicates when e-mail has been opened by the recipient, not read).

Performance reports were utilized minimally, but were not maximized for immediacy, efficiency, nor as additional encouragement to complete exercises

prior to deadlines. This might create a competitive atmosphere among students, which could have significant repercussions on the learning experience (Kiesler, 1991). The concept of student confidence level could also be addressed by studies on performance reports, to overcome the effects of high confidence/low performance level or low confidence/high performance level. Research on the effectiveness of performance reports could be quite useful in further developing effective instructional design guidelines.

Performance realism was achieved minimally with this case study. As development of the online course continues, however, these guidelines could have more impact. When the software is upgraded, animation, video and audio enhancements could be employed and performance realism should be carefully considered at that time. Establishing an optimal level of animation and the effects of video or audio enhancements on interactivity and time efficiencies could add desirable improvements to the body of knowledge for online education.

The number of error responses could not be monitored by the utilized computer software and the number of response requests could not be adapted to student performance as a result. Noting the number of students who did not perform well on the two tests (the professors indicated they would prefer to have all "As" -- 90 percent or better for correct responses -- on the tests and that successful completion of the tests was their goal, not just completion), future studies should investigate further the value of adapting the number of response requests to student performance.

Reflection was required in response requests frequently, but students who negatively assessed the online experience indicated that the response requests appeared to be too complicated. When students are required to use higher order thinking skills, particularly if they are ill-prepared to do so, they might experience frustration. Whether students were more frustrated with the computer system or the nature of the response requests was not clear in this study. Perhaps adequately preparing students to demonstrate higher order thinking skills is an important prerequisite for effective online and programmed instruction and that could form the basis of future research.

Multiple passes were highly encouraged by the response requests and students commented positively on this aspect of the case study. When conceptual hierarchies were identifiable, the students were required to process relationships. Concept formation was achieved to some degree, based on the assessments of student performance, and the professors believed an adequate range of examples was provided.

The computer was not well utilized to promote efficiency in this online course, so considerable improvement is possible. If the professor interface with students is further eroded during online course delivery, by allowing the computer to complete more of the interactive elements (such as feedback), will students continue to assess the online experience as a positive one? This aspect requires more research.

Maintaining a high level of cognitive processing with response requests, using inquiry learning, was possible with this case study, but this researcher also

maintained variety in the level of cognitive processing required. While concept formation (a high order cognitive skill) is important, simple recall (a low order of cognitive skill) of appropriate terms could also be useful. To encourage word recognition and concept formation, the interactive strategies should also include this guideline: Provide an adequate range of cognitive processing levels (low to high) to establish content mastery and student performance at accepted standards.

If more reliance on the computer system is advisable (to promote efficiency and optimal student performance), an adequate backup system to maintain course integrity will be necessary. Considering the equipment failure problems revealed by this case study and the potential for serious consequences those failures could have had on the course, as well as this dissertation, colleges are well advised to ensure emergency resources. With this in mind, one of the presentation logistics guidelines should be revised to read: Provide adequate support technicians and resources (including thorough backup systems) from host institution.

Time efficiency was calculated by a comparison to traditional course delivery methods (meeting face-to-face with an instructor). This is a reasonable initial comparison and evaluation, but hardly represents thorough research into time efficiency for instruction. While some research included in the literature review conducted for this dissertation was generated in response to corporate training situations, time efficiency has pertinent implications for higher education students and faculty, as well. One of the common claims for CBI and course

delivery online is a time-saving benefit, but as this study revealed, time-saving is not an automatic feature of online instruction. Time efficiency should be maximized and that will most likely occur with further research on the issue. Rather than constructing a course in human communications to fit an arbitrarily selected time frame (e.g., one semester), an appropriate research approach would be to test how quickly students could move through the selected material and still achieve performance at selected standards. Future research should examine this issue. The theoretical framework should include this rephrased guideline: Empirically test interactivity to establish if practice provided will optimize time efficiency while remaining sufficient to achieve mastery for performance at selected standards.

Further exploration of the whole screen phenomenon would be beneficial in future research. Do learning barriers occur when pages require scrolling? All but one of the pages used in this online course required scrolling and students offered no complaints about that, but when students engaged in the listserv assignments, they did offer negative reactions to those student responses that went beyond one whole screen.

Some students focused on the entertainment value of working online. That concept was not a consideration in the instructional design process, but as a learner preference or an objective, entertainment could influence instructional effectiveness. Therefore, further research should be undertaken to determine the value of entertainment incorporated into the design of the course. Such research may yield additional guidelines for effective instructional design.

This case study was undertaken to explore the revolutionary promise of online course delivery. That promise is that students will engage content more enthusiastically, will learn more, will gain more breadth or richness of content, will retain more, and eventually will become better practitioners. The findings in this case study support the enthusiasm with which students approach the content. However, the study did not support increased learning nor gaining more breadth or richness of content. Bolstering the theoretical framework used to design this online course might improve learning, as well as breadth and richness of content. Obviously, this case study is not a longitudinal study and the concepts of retention and improved practice have not been addressed here.

The records maintained by this researcher indicate a significant investment of time to develop the online course and to maintain the integrity of the online lessons as the course progressed. Host institutions may not be prepared to meet such time demands for professors, which presents a growing opportunity for corporations like Real Education, Inc. to provide online course development to higher education providers.

Limitations of this Study

Following the naturalistic inquiry methods of analysis proposed by Lincoln and Guba (1985) and case study analysis methods suggested by Merriam (1988), this case study established several guidelines for effective instructional design, as well as examining the paradigm of a computer-assisted online college course using programmed instruction. An audit (Appendix I), utilizing the Halpern

model as described by Lincoln and Guba (1985) and analysis guidelines provided by Merriam (1988), revealed the following characteristics of this case study:

- (1) The findings in this study are dependable, based on conclusions that appropriate and complete data were explored, the researcher avoided early closure by conducting a thorough case study, and the methodology was appropriate to the purpose of the study.
- (2) The findings in this study are confirmable, based on conclusions that the findings were grounded in the data, the conclusions were logical, the researcher relied on triangulation to avoid inquirer bias, and introduced thorough analysis of the data, both negative and positive.
- (3) The study contains evidence of validity, with accommodation for the qualitative nature of the study. As clarified by Lincoln and Guba (1985), a naturalistic study cannot specify external validity, but can provide a thorough and rich description of the study so readers can determine if transferability of the data obtained is feasible. Merriam (1988) stated that internal validity in case studies is usually acceptable, but the concept of generalizability is not applicable to the naturalistic inquiry method employed by a case study (p. 173). This is, of course, a significant limitation for this study.
- (4) This case study provides evidence for reliability, with accommodation for the qualitative nature of the study. Merriam dictated the qualitative case study must present a comprehensive literature review, which this study has

included. Triangulation of data and a thorough audit trail are also evidence of reliability. This case study satisfied those requirements.

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Appendix A
Course Homepage

Week Eight (dates inserted here)

1) Read Chapters 16, 17, and 18 in *An Introduction to Human Communication*.

2) Complete the online speech development exercises labeled...

- Step 6 -- Introduce topic
- Step 7 -- Conclude topic
- Step 8 -- Rehearse and revise
- Step 9 -- Deliver
- Step 10 -- Consider evaluations

Week Nine (dates inserted here)

Break. Practice your prepared speeches.

Week Ten (dates inserted here)

All assignments this week are due no later than Friday, noon, unless otherwise indicated. This week is reserved for group project organization. The forms needed for the group project are listed below, with one form for each group (the group selects one group member to submit the form for the entire group). Submit forms 1 and 2 this week.

- Group Project Form 1: Group organization form
- Group Project Form 2: Weekly group meetings report
- Group Project Form 3: Group member/leader assessment
- Group Project Form 4: Group project assessment

Week Eleven through Fifteen (dates inserted here)

Submit Group Project Form 2 each week, except the week of fall break (dates inserted here). Groups must meet at least twice each week (except fall break). Group forms are due no later than Friday, noon, each week. Your essay (an individual project) is due anytime between (dates inserted here), but no later than Friday, noon, before fall break.

Week Sixteen (dates inserted here)

This week is reserved for group project reports to the class. Each group has 30 minutes for their presentation. Presentations will be by random draw at the beginning of class. Submit Group Project Forms 3 and 4 (one per group) by Friday, noon, this week. There is no final for this course.

Principles of Communication

(course date and professor's name inserted here)

Online Exercises

<u>Start here!</u> <u>Orientation exercise</u>	Answer the <u>Listserv</u> query each week (Week One through Week Five)	<u>A: Introduction</u> Due during Week Two
<u>B: Perception</u> Due during Week Two	<u>C: Self-Awareness</u> Due during Week Two	<u>Week Two Assessment</u> Due during Week Two
<u>D: Listening Skills</u> Due during Week Three	<u>E: Nonverbal Messages</u> Due during Week Three	<u>F: Verbal Messages</u> Due during Week Three
<u>Self-Test One</u> Due during Week Three	<u>Week Three Assessment</u> Due during Week Three	<u>G: Conversations</u> Due during Week Four
<u>H: Conflict Management</u> Due during Week Four	<u>I: Interpersonal Relationships</u> Due during Week Four	<u>M: Mass Communications</u> Due during Week Four
<u>Week Four Assessment</u> Due during Week Four	<u>J: Interviewing Skills</u> Due during Week Five	<u>K: Small Group</u> <u>Interaction</u> Due during Week Five
<u>L: Leadership in Group</u> <u>Interaction</u> Due during Week Five	<u>Self-Test Two</u> Due during Week Five	<u>Week Five Assessment</u> Due during Week Five
<u>Speech Development</u> Steps 1-5 due during Week Six	<u>Speech Development</u> Steps 6-10 due during Week Seven	<u>Group Project Form 1</u> One per group, due during Week Ten
<u>Group Project Form 2</u> One per group, due each week, Week Eleven through Week Fifteen (not during Fall Break)	<u>Group Project Form 3</u> One per group, due during Week Sixteen	<u>Group Project Form 4</u> One per group, due during Week Sixteen

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(course dates and professor's name inserted here)

Communication Page

You can communicate with members of Principles of Communication this term by selecting this line:

Communication Listserv

You can communicate with individuals in the course, including the instructor, by selecting the appropriate line below (if the line is blue):

<u>student's name</u>	<u>student's name</u>	<u>student's name</u>
<u>student's name</u>	<u>student's name</u>	<u>student's name</u>
<u>student's name</u>	<u>student's name</u>	<u>student's name</u>
<u>student's name</u>	<u>student's name</u>	<u>student's name</u>
<u>student's name</u>	<u>student's name</u>	<u>student's name</u>
<u>student's name</u>	<u>student's name</u>	<u>student's name</u>
<u>student's name</u>	<u>student's name</u>	<u>student's name</u>
<u>student's name</u>	<u>student's name</u>	<u>student's name</u>

Professor's name inserted here

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Appendix C
Exercises A through M

Principles of Communication

Exercise A: Introduction

Your Name:

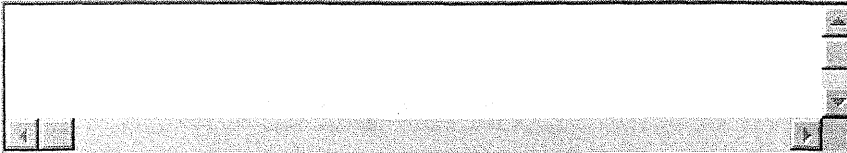
Read Chapter 1 in *An Introduction to Human Communication* before you complete this exercise. This assignment is due between [dates inserted here], but no later than Friday, noon.

1. Give me one good reason for taking a class in the principles of communication. What could you possibly gain from this experience (besides a grade)?

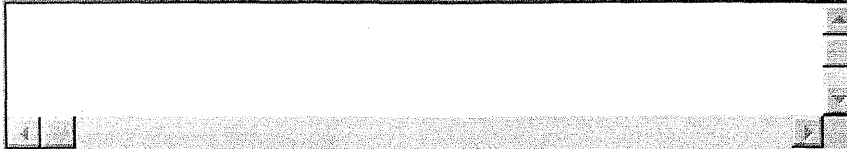
2. What's going on here? Margo has just taken over as vice president in charge of sales for a manufacturing company. Margo is extremely organized and refuses to waste time on nonessentials. In her staff meetings, she is all business. Several top sales representatives have requested to be assigned to other VPs. They feel Margo works them too hard and doesn't care about them as people. Explain what is going on here, by considering the following principles of communication:

- Communication is a package of signals (we can't separate nonverbals from verbals in most communication situations).
- Communication involves content and relationships (how we interpret the content of communication depends a great deal on the relationship we have with the communicator).
- Communication is transactional (we aren't just vessels, receiving all communication; we also send communications of our own, initiating communication and reacting to communication).
- Communication is inevitable (unless you're dead, you're communicating).
- Communication is purposeful (don't confuse that with intentional -- purposeful communication may achieve a goal we weren't looking for!).
- Communication is irreversible and unrepeatable (sorry, you can't take it back and you'll never be able to repeat it with quite the same effect).

3. In the space below, write a brief description of how to tie a shoe lace.



4. Your description in #3 above is a one-way, linear form of communicating a fairly simple task. How could this description be improved if you were given complete communication freedom (i.e., you weren't limited to writing a description online, but could communicate anyway you wanted to)? The communication models on page 9 in your text will help you answer this question!



That's it for Online Exercise A! Now, submit the form (so I can see your answers) and check the page that comes up when you use the "submit form" button! That page will tell you if the submit form button worked properly (whether your answers were sent successfully to my email account). Also, print a copy of your answers on this page (use the "print" button from your Web browser software, which you should see above somewhere). That way, you have clear evidence that you completed this exercise and you can use this exercise to study for Test One.



Go on to Online Exercise B.

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Exercise B: Perception

Your Name:

Read Chapter 2 in *An Introduction to Human Communication* before you complete this exercise. This assignment is due between [dates inserted here], but no later than Friday, noon.

1. Perception Check-up

Your text suggests that much of communication effectiveness relies on our perceptions. Let's check out those perceptions for accuracy with a few interesting exercises.

Go to the link below for just one minute (time yourself). Count the Fs you see on that page and then come back here and type in how many Fs you counted. Go to "Count the Fs"

Don't read any further until you follow the instructions above. So how many Fs did you count? Many observers will count only three or four. Why wouldn't we all see all six Fs? It could be because some Fs are more obvious than others, both by what you see (the Fs that begin a word) and what you "hear" (the Fs in "of" sound like a "v"). Have you observed other situations where only the important (obvious) things get attention? How can we persuade others to pay more attention to detail? Is detail always important?

Let's try another observation. Look at the picture on the link below and follow the directions on that page. Go to "Woman."

Don't read any further until you have followed the instructions above. So, you saw either a young woman, looking away from the viewer, wearing a fancy hat. Or, you saw an old woman, looking down to the bottom left corner of the picture, with her chin on her chest. Or, you saw both. Consider these questions: How does our attitude influence our perception? How about our age, our social status, our background? Do these influence our perception? What can be done to open our minds to new learning, new ways of perceiving our world?

Okay, one more. This requires you to look at the picture in the link and to count

Don't read any further until you have followed the instructions above. Why didn't you (if you didn't) discover all of the triangles on your own? How does our approach to a task influence our perceptions?

[illegible]

What's going on here? The whole class attended the meeting, but Sam thinks the assignment is due on Monday, Perry thinks the assignment is due on Tuesday, and Tanya says the assignment is optional. How could three people at the same meeting have such different interpretations of what happened?

[illegible]

Your professor informs you that your essay earned a B. First the professor explains what the significant strengths were in your paper. Then the professor carefully describes the problems you had. You disagree with the grade, believing your paper should have earned an A. You focus on the strengths the professor mentioned, and explain that you satisfied what the professor asked for in the assignment. What is influencing your perception in this example? (Hint: read pages 22- 30 in your text.)

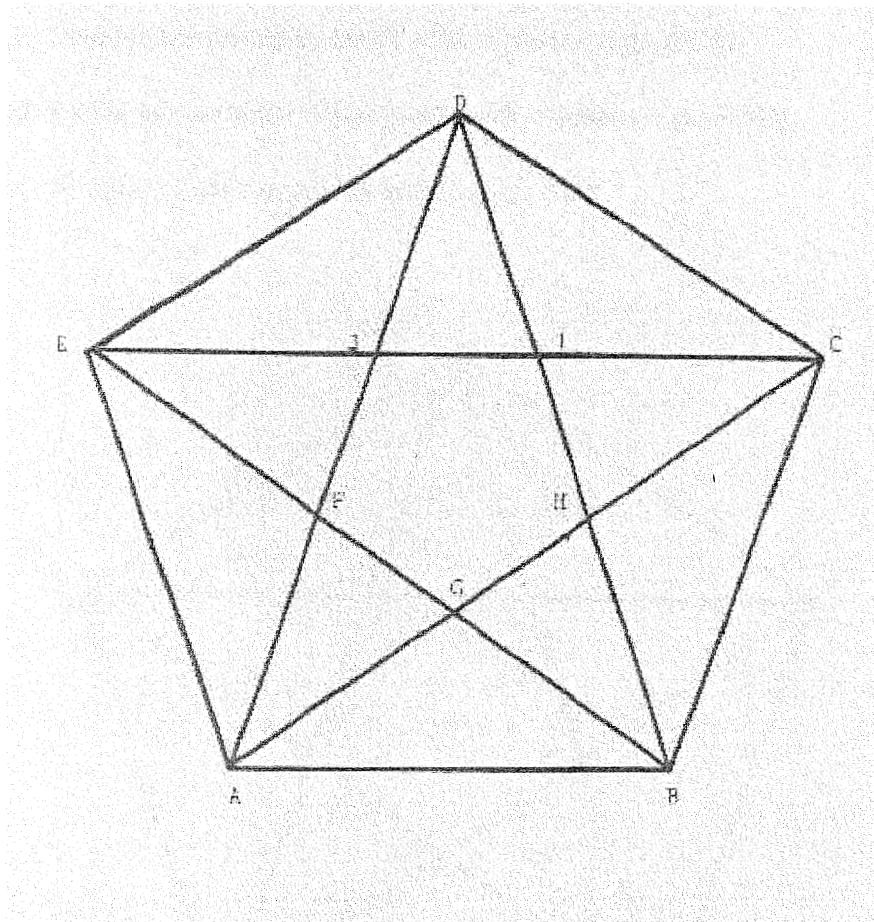


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Triangles Exercise

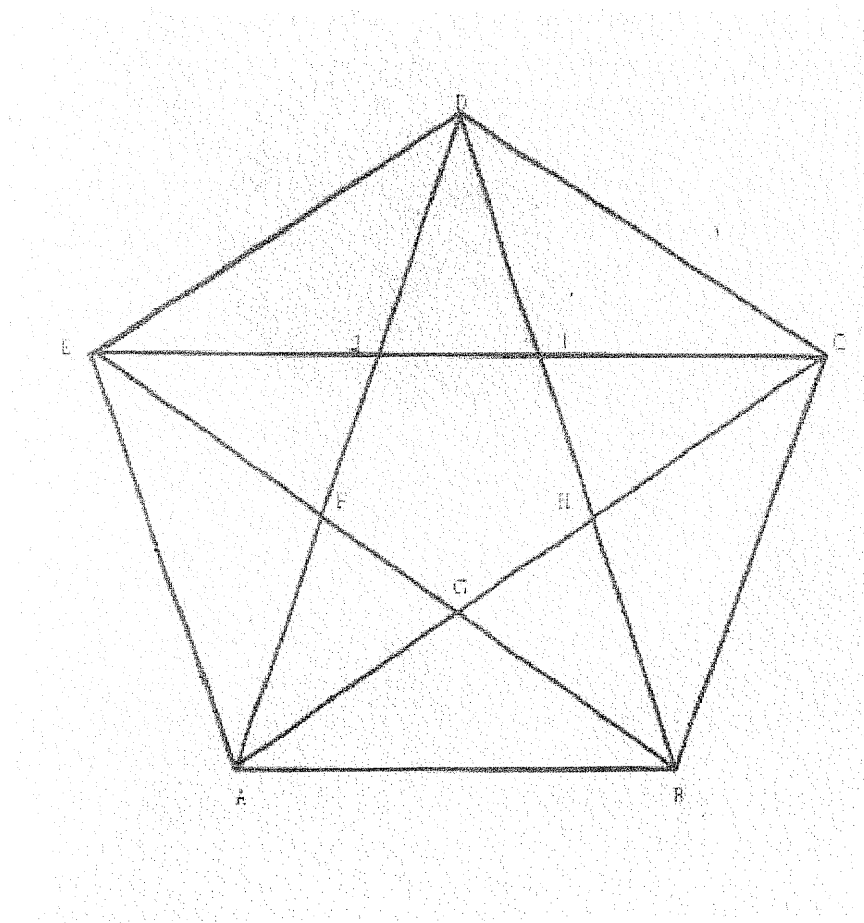
Count the triangles below, taking 2 minutes to complete your count:



Before you go back to exercise B, would you like the answer? Go to **"Triangles Answer"**. When you're done, return to Exercise B by using the "back" button above.

The answers to the triangle exercise (there are 35 triangles):

1. There are 10 small single triangles (without any intersecting lines in them, e.g., AFG).
2. There are 5 tall triangles (each with an external side as a base, and containing 5 pieces, e.g., ABD).
3. There are 5 long-base triangles (each with 3 pieces, e.g., ACJ).
4. There are 5 with two exterior sides (each with 3 pieces, e.g., EAB).
5. There are 10 with 2 small triangles inside, e.g., ABF.



Return to Exercise B by using the "back" button above (you'll need to hit it twice).

Identifying Perceptions Exercise

Look at the picture below. What do you see?

When you've typed in your answer, return to Exercise B by using the "back" button above.



Count the Fs Exercise:

Take one minute to count the Fs, then return to Exercise B (use the "Back" button on the toolbar above):

**FEATURE FILMS ARE THE RESULT OF YEARS OF SCIENTIFIC
STUDY COMBINED WITH THE EXPERIENCE OF YEARS.**

Principles of Communication

Exercise C: Self Awareness

Your Name:

Before you complete this exercise, you should read Chapter 3 in *An Introduction to Human Communication*. This assignment is due between [dates inserted here], but no later than Friday, noon.

1. How willing are you to "self-disclose"? Respond to each of the following statements by indicating the likelihood that you would disclose such items of information to, say, other members of this class in an interpersonal situation, one on one; in a small group situation with, say, five or six others; and in a public communication setting where you speak to all juniors at this college. Use the following scale, filling in all three columns:

- 1 = would definitely self-disclose
- 2 = would probably self-disclose
- 3 = don't know
- 4 = would probably not self-disclose
- 5 = would definitely not self-disclose

Information	Interpersonal Communication	Small Group Communication	Public Communication
1. My attitudes toward other religions, nationalities, and races	<input type="text"/>	<input type="text"/>	<input type="text"/>
2. My economic status	<input type="text"/>	<input type="text"/>	<input type="text"/>
3. My feelings about my parents	<input type="text"/>	<input type="text"/>	<input type="text"/>
4. My sexual fantasies	<input type="text"/>	<input type="text"/>	<input type="text"/>
5. My physical and mental health	<input type="text"/>	<input type="text"/>	<input type="text"/>
6. My ideal mate	<input type="text"/>	<input type="text"/>	<input type="text"/>
7. My drinking and/or drug behavior	<input type="text"/>	<input type="text"/>	<input type="text"/>
8. My most embarrassing moment	<input type="text"/>	<input type="text"/>	<input type="text"/>
9. My unfulfilled desires	<input type="text"/>	<input type="text"/>	<input type="text"/>
10. My general self-concept	<input type="text"/>	<input type="text"/>	<input type="text"/>

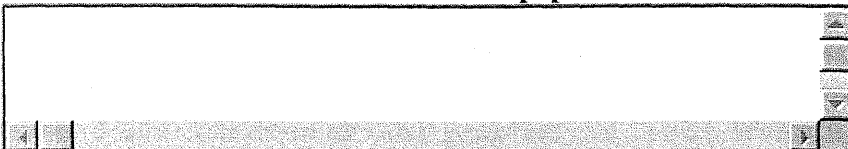
2. The goal behind an exercise like the one above is to encourage you to conduct a

personal inventory of your philosophical position. Based on your answers above, how would you characterize your self-disclosure philosophy?



3. Considering your philosophy, decide if self-disclosure is appropriate in the scenarios below. Specify the reason(s) for your decisions.

a. A student plagiarized a term paper in environmental biology. He is sorry, especially since the plagiarized paper only earned a grade of C+. He wants to disclose to his instructor and redo the paper.



b. Tom has fallen in love with another woman and wants to end his relationship with Cathy. He wants to call Cathy on the phone, break his engagement, and disclose his new relationship.



c. You are involved with another person and have been disclosing your past romantic encounters, fears, insecurities, ambitions, and so on. Your partner, on the other hand, has not shared his/her feelings with you, and you know practically nothing about this person's life before you met. You are beginning to wonder if you should limit your disclosures in the future.



That's it! You're finished with another online exercise! Submit it before you end this session and print a copy of your answers.



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Exercise D: Listening

Your Name:

Read Chapter 4 in *An Introduction to Human Communication* before you complete this exercise. This assignment is due between [dates inserted here], but no later than Friday, noon.

1. As listeners, we tend to take hearing for granted. An interesting exercise, though, is to separate what you learn visually from what you learn through listening. Select any half-hour television or video program you prefer. Watch for five minutes with the sound turned so low you can't hear it. Can you determine what is going on? Now, turn up the volume so you can hear it, but close your eyes for another five minutes. Can you still tell what is going on? Watch and listen to the rest of the program. Which method of communication revealed the most to you about the situation, the plot and the characters? Describe your experience and your observations.

2. Sometimes as speakers (or writers) we try to impress, not express. But simple and direct communication is usually much more effective. In 1942, for example, a blackout order was sent to the troops: "Such preparations shall be made as will completely obscure all Federal buildings and non-Federal buildings occupied by the Federal government during an air raid for any period of time from visibility by reason of internal or external illumination."

Franklin D. Roosevelt thought that was poor communication and made this suggestion, "Tell them that in buildings where they have to keep the work going to put something across the windows."

You've heard the following phrases several times, but were you listening? Translate the "written to impress" versions into plain English -- the way we talk.

a) An ignoramus and his/her lucre are readily disjoined.

b) A singular specimen of the scientific class of avis contained within the boundaries of the upper prehensile, is equivalently valuable as a doubled inventory of that item located in a low-spreading thicket.

c) A condition characterized by tardiness is more desirable than one that is systematically marked by eternal absenteeism.

3. Often when we hear words in conversation we are actively listening (see your text for an explanation of "active listening"), but the meaning is unclear. We use many vague words in everyday language. A quick, unscientific survey of our class will demonstrate this point. For each frequency word below, select a number between 0 to 100 that the word represents.

Example: never = 0 and every time = 100. Another example: "When I'm mad, I often drive too fast." How much is "often"?

often		occasionally	
quite often		seldom	
sometimes		a lot	
usually		rarely	
most of the time		frequently	

In a recent survey, using these same "frequency words," the range on each word was at least 20 points, some were as high as 50. Now, explain if you can, how someone could believe "often" is equivalent to 25, while someone else thinks "often" is about 75? Why do we have such different interpretations of words like "occasionally"? What are the implications for our ability to communicate effectively?

4. Another reason active listening requires critical analysis is that we often hide meaning in our communication. Riddles are a good example of communication with purposefully embedded information or meaning. Try a few riddles, by responding in the space provided.

Is there any federal law against a man marrying his widow's sister?

If you had only one match and entered a cold room that had a kerosene lamp, an oil heater, and a wood stove, which would you light first for maximum heat?

According to International Law, if an airplane should crash on the exact border between two countries, would unidentified survivors be buried in the country they were traveling to, or the country they were traveling from?

An archeologist claims she has dug up a coin that is clearly dated 46 B.C. Why is she a liar?

5. One of the skills you need for active listening is the ability to paraphrase. Carefully paraphrase each of the messages below, so that you put the essence of the statement(s) in your own words without changing the meaning.

"I got a C on that paper. That's the worst grade I've ever received. I just can't believe that I got a C. This is my major. What am I going to do?"

"I really had a scare with the kids the other night. They went out to the night game at the high school. They didn't walk in till two a.m. I thought I'd die."

"I just found out today that I'm HIV positive. I don't know what to do, I feel so lost and scared."

6. Critical thinking is an important skill to help build an effective perception of the world. Your text provides several important guidelines for critical listening and thinking in Chapter 4. Explain the following critical thinking guidelines in your own words, using the text as a guide.

Formulate your own hypotheses

--	--

Look for a variety of clues

--	--

Avoid mind reading

--	--

Beware of your own biases

--	--

Seek validation

--	--

Be sensitive to cultural differences

--	--

That's it! You have finished online exercise D! Submit this form with your answers and print a copy for your records.

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Go to Exercise E.

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Return to WPC Homepage

Principles of Communication

Exercise E: Nonverbal Messages

Your Name: _____

Read Chapter 5 in *An Introduction to Human Communication* before you complete this exercise. This assignment is due between [insert dates here], but no later than Friday, noon.

1. Your ability to learn from nonverbal communication depends a great deal on how observant you are. Test your powers of observation by answering the following questions:

- a) What color strip is directly under the blue field in the US flag? ☐ red ☐ white
☐ blue
- b) Is the full moon high or low in a June sky in the US? ☐ high ☐ low
- c) What building is shown on the five dollar bill?
- d) Which king on the standard playing card is shown in profile? ☐ Club
☐ Diamond ☐ Spade ☐ Heart
- e) Is the coin return on the right or the left side of the pay telephone? ☐ Left
☐ Right

Go to "Observant Answers" to check your responses above. Are you observant?

- ☐ Yes ☐ No

2. Go to a crowded place (a shopping mall, a busy street, a movie theater) and just observe people interacting for 5 minutes. What can you tell about the people you observed? Can you guess if couples are dating or married? Can you guess if children together are brothers/sisters or just friends? How are you making these judgments? What cues do people provide nonverbally about their relationships with others?

3. Conduct a quick study of your orientation to time, space and others.

Do you wear a watch? If you wear a watch, how often do you look at it during the day? Do you always know what day of the week and what date it is? What do these behaviors communicate about you?

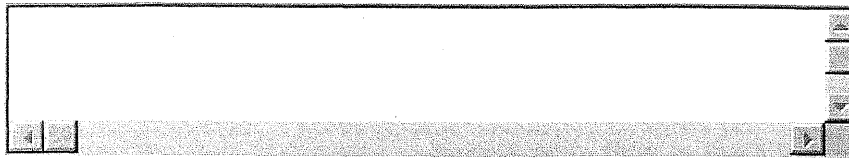
Let's take a look at your bedroom. Would you allow the entire class to inspect it right now? Is it clean? Is it orderly? Is it well-decorated? What about the rest of your home? Or the inside of your car? What do your personal spaces communicate about you?

Now take a critical look at your family and close friends. How do they dress? Can we guess their age, their education level, their work roles? Do your family and friends have well-developed social skills and effective interpersonal relationships? What do your family and friends communicate about you?

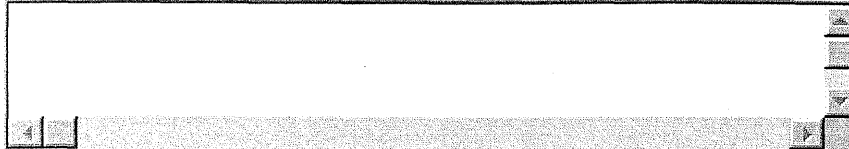
4. We communicate with color -- all you have to do is talk to an advertising designer to discover the significance of color in communication. In fact, you have been conditioned to think of certain products in certain colors. Try this test: select an appropriate color for the products listed below.

Product	Color
toothpaste	
rich ice cream	
breakfast cereal	
cat food	
package in a fancy jewelry store	
a man's double-breasted suit	
socks worn with sandals	

How have you formed your preferences for these colors? Do your friends and/or family members share the same color preferences? Try a test -- share this quick survey with one family member and one friend and compare their answers to yours. From this totally unscientific survey, do you think we share common color preferences through cultural exposure or are we born with a preference for color schemes?



5. On pages 79-80 in your text, the authors discuss the concept of paralinguistic features. Read over that section. Now, describe the paralinguistic and other nonverbal cues needed to convey praise with this statement: "Now that looks good on you!"



Describe the paralinguistic and other nonverbal cues needed to convey criticism with this statement, "Your parents are really something!"



6. How do we come to use similar nonverbal communication skills? Are we all born with this ability or do we learn it? If we learn it, how does that happen? Who/what teaches us to use nonverbal cues?



That's it! You have finished online exercise E! Now submit your answers and print a copy of this exercise for your records.



Go to [Exercise F](#).

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Observant Answers

- a) What color strip is directly under the blue field in the US flag? *White*
- b) Is the full moon high or low in a June sky in the US? *Low*
- c) What building is shown on the five dollar bill? *Lincoln Memorial*
- d) Which king on the standard playing card is shown in profile? *Diamond*
- e) Is the coin return on the right or the left side of the pay telephone? *Left*

Go back to Exercise E.

Principles of Communication

Exercise F: Verbal Messages

Your Name: _____

Read Chapter 6 in *An Introduction to Human Communication* before you complete this exercise. This assignment is due no later than Friday, noon, during the third week of the semester.

1. Earlier in your text, you read about separating facts from inferences. We often use verbal information as though it were completely true and we often "read between the lines" with verbal information. Carefully read the following report (from Joseph A. DeVito's *Essentials of Human Communication*, 2nd edition) and the observations based on it. Indicate whether you think the observations are true, false, or doubtful on the basis of the information presented in the report. Select "true" if the observation is true, "false" if the observation is false, and "unknown" if the observation may be true or false. Judge each observation in order. Do not reread the observations after you have indicated your judgment, and do not change any of your answers.

A well-liked college teacher had just completed making up the final examinations and had turned off the lights in the office. Just then a tall, broad figure with dark glasses appeared and demanded the examination. The professor opened the drawer.

Everything in the drawer was picked up and the individual ran down the corridor. The dean was notified immediately.

- ☐ True ☐ False ☐ Unknown 1) The thief was tall, broad, and wore dark glasses.
- ☐ True ☐ False ☐ Unknown 2) The professor turned off the lights.
- ☐ True ☐ False ☐ Unknown 3) A tall figure demanded the examination.
- ☐ True ☐ False ☐ Unknown 4) The examination was picked up by someone.
- ☐ True ☐ False ☐ Unknown 5) The examination was picked up by the professor.
- ☐ True ☐ False ☐ Unknown 6) A tall, broad figure appeared after the professor turned off the lights in the office.
- ☐ True ☐ False ☐ Unknown 7) The man who opened the drawer was the professor.
- ☐ True ☐ False ☐ Unknown 8) The professor ran down the corridor.
- ☐ True ☐ False ☐ Unknown 9) The drawer was never actually opened.
- ☐ True ☐ False ☐ Unknown 10) Three persons are referred to in this report.

Go to the Fact/Inference page to find out how you did on this exercise. What is the major difference between statements of fact and inferences?

2. We are very structured in our preferences for verbal communication. We have rules for grammar, spelling, and punctuation. We establish guidelines for design and delivery. When verbal communication doesn't follow these dictates, we often experience communication failures and conflict. Test your ability to think critically about verbal communication that ignores standard communication rules. Each of the following examples represents a well-known phrase. Indicate your best interpretation in the space provided.

Example: P L O T = "The plot thickens."

A CHANCE N =

LU CKY =

ME

It's It's It's It's It's =

ALL / World =

NOITANIMIRCSID =

Go to "Riddles" for the answers (no peeking!)

3. Verbal language can often be inflammatory, even when we don't intend to be that way. To avoid conflicts based on our word choice, we can describe features, action or behaviors, instead of using labels that describe people or objects.

Example: "He is a poor student" is a label. Instead of using a label, you could describe his actions: "He misses assignment deadlines most of the time."

Rewrite the following sentences to describe behavior, not labels.

"They are inconsiderate."

"This text book is a pain."

"Online classes are fun."

"That professor is boring."

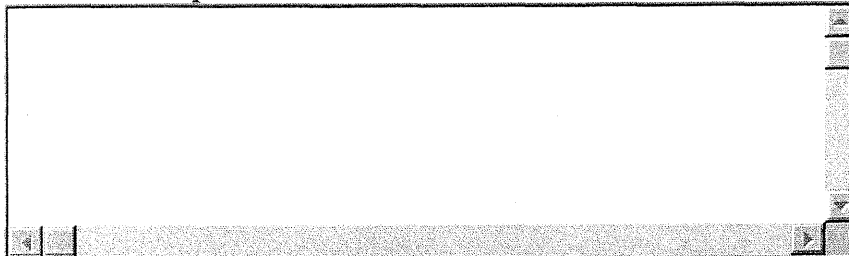
"She is a flirt."

4. We tend to form a variety of opinions -- often called stereotypes -- that reflect our experiences and perceptions. What are your opinions about men and women and their verbal communication skills? Indicate your responses below.

- a) Women talk more than men. ☐ True ☐ False
- b) Men are more comfortable talking in front of groups than women are. ☐ True ☐ False
- c) Men fail to talk and/or listen enough once they are married. ☐ True ☐ False
- d) All gossip is negative. ☐ True ☐ False
- e) Women gossip more than men do. ☐ True ☐ False
- f) Men tend to be more assertive than women. ☐ True ☐ False

While the question above ask for your opinions, research has some interesting revelations. Go to "[Gender Stereotypes](#)" for more information on the issues listed above.

5. Beyond gender stereotypes, we often experience communication conflicts across cultures. Roger Axtell, a prominent writer in the field of international communication (e.g., *Do's and Taboos in Hosting International Visitors*), recommends avoiding the following topics in conversations with foreign visitors: religion, politics, highly personal questions, the word "no," geography, and ethnic jokes. Why? How could these topics inhibit effective communication?



That's it! You have finished online exercise F! Submit your answers and print a copy of this exercise for your records.



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Answers to the Riddles:

A CHANCE N = AN outside CHANCE

LU CKY = Lucky break

ME

It's It's It's It's It's = It's beneath me

ALL / World = It's a small world after all.

NOITANIMIRCSID = Reverse discrimination.

Return to Exercise E.

Fact/Inference Exercise

Now that you have answered the questions, go back and look at them again, while you ask yourself, "How can I be absolutely certain the statement is true or false?"

You should find that only one statement is true and one statement is false; eight should be marked "?"

Can you determine which one is definitely true and which one is definitely false?

Return to Exercise E.

Gender Stereotypes

a) Women talk more than men. Not so, according to the research (see Deborah Tannen's book "You Just Don't Understand: Women and Men in Conversation"). Men not only talk more often, they tend to talk longer.

b) Men are more comfortable talking in front of groups than women are. True. Men often say they have no problems speaking in front of groups, where women will often confess to feeling anxiety. Why? The rationale for this is complicated, but Tannen suggests that women are encouraged to talk more one-on-one than men are, whereas men are encouraged to lead groups.

c) Men fail to talk and/or listen enough once they are married. Women often say "true" and men usually say "false." According to Tannen, the difference points to a difference in defining "conversation." Women prefer conversations that explore personal feelings, men prefer fact-based, task-oriented conversation.

d) All gossip is negative. Your answer has a great deal to do with how you were raised and your gender identity. Women tend to see value in gossip, as a means to validate opinions and ideas. Men tend to ridicule gossip as negative and cruel.

e) Women gossip more than men do. Your answer here depends on your definition of gossip. If having a conversation about colleagues is part of a task, then the conversation isn't gossip (e.g., discussing colleagues while trying to determine who should be invited to serve on a committee). If having a conversation about acquaintances is the purpose, then the conversation is gossip (e.g., discussing people and their behavior on volunteer committees). What's the difference in the two conversations?

f) Men tend to be more assertive than women. True, according to research. Tannen and many other writers, including DeVito, suggest that women will improve their ability to communicate if they learn assertiveness techniques. Men, on the other hand, improve their communication when they learn to value exploratory (instead of task-oriented) conversation the way women do.

Back to Exercise E.

Principles of Communication

Exercise G: Conversation

Your Name:

Read Chapters 7 in *An Introduction to Human Communication* before you complete this exercise. This assignment is due no later than Friday, noon, during the week of [dates inserted here].

1. Do you get nervous when you have to speak to someone (one-on-one)? Here's a brief test text to measure your interpersonal communication apprehension level. Indicate in the spaces provided the degree to which each statement applies to you by marking whether you (1) strongly agree, (2) agree, (3) are undecided, (4) disagree, or (5) strongly disagree. Don't be concerned that some of the statements are similar to others. Work quickly; just record your first impressions.

1) While participating in a conversation with a new acquaintance, I feel very nervous.

2) I have no fear of speaking up in conversations.

3) Ordinarily I am very tense and nervous in conversations.

4) Ordinarily I am very calm and relaxed in conversations.

5) While conversing with a new acquaintance, I feel very relaxed.

6) I'm afraid to speak up in conversations.

To obtain your apprehension score, use the following system: total the scores for items 2, 4, and 5; then, subtract the total of scores from items 1, 3, and 6. A positive score shows some degree of apprehension. Of course, conversations vary widely in the degree to which they may lead to apprehension. For which types of conversation do you experience the most anxiety? The least? Do others experience apprehension when talking with you?

2. Compare a conversation with a college friend to one you might have with a parent. On what dimension(s) are these conversations different?



3. You are traveling in a foreign country and stop at a store to buy water (or some other basic item). You can't speak the language and the store clerk doesn't speak English. What do you do to purchase the item you want?



4. When I was in high school, we used colloquialisms to express familiar ideas. "Wanna ride in the City?" Do you have any idea what we meant? (The phrase meant, "Let's cut school and go to San Francisco for the day" -- something we couldn't get away with very often!) Colloquialisms (words or phrases used informally with a regionally-based meaning) can be obstacles to communication. Provide an example of a colloquialism (and explain it!).

[illegible]

5. Euphemisms are common in conversation. These are words or phrases used as replacements for other words or phrases considered negative or inappropriate. Instead of saying, "Where's a toilet?" we might say, "Where's a bathroom?" even though we aren't interested in taking a bath. Euphemisms tend to change over time. When I was young, we would say "Negro" to indicate an African-American. Then the acceptable word was "colored person" then "black" and now "African-American." What's wrong with euphemisms? They can be misleading, they are often regionally-based, and may depend largely on context to be effective. They also allow us to avoid problems and conflicts, instead of dealing directly with those problems or conflicts. Provide an example of a current euphemism.

6. Jargon is language common to a specific group or profession. The problem with jargon is that it can be vague, or exclusive (you don't understand the jargon unless you are a group member). Another problem with jargon is a specific word can have quite different meanings, depending on the profession, and that leads to communication breakdowns. Example: "Pica" in journalism refers to a measurement about 1/6 of an inch, but in psychology refers to a disorder of cravings for non-food items (like chalk). Provide five examples of jargon from your major or profession:

--	--

7. Many misconceptions have developed concerning conflict. Measure your perceptions of conflict below. Rate each dimension of conflict by selecting one option ranging from "never" to "always."

a) *Conflict is abnormal.*

☐ Never ☐ Rarely ☐ Sometimes ☐ Often ☐ Always

b) *Conflict is destructive.*

☐ Never ☐ Rarely ☐ Sometimes ☐ Often ☐ Always

c) *Conflict happens when communication is ineffective, because effective communication prevents conflict.*

☐ Never ☐ Rarely ☐ Sometimes ☐ Often ☐ Always

d) *Conflict must be resolved quickly.*

☐ Never ☐ Rarely ☐ Sometimes ☐ Often ☐ Always

e) *Conflict must be resolved by compromise.*

☐ Never ☐ Rarely ☐ Sometimes ☐ Often ☐ Always

f) *The only way to end conflict is to win.*

☐ Never ☐ Rarely ☐ Sometimes ☐ Often ☐ Always

g) *Women handle conflict more constructively than men do.*

☐ Never ☐ Rarely ☐ Sometimes ☐ Often ☐ Always

h) *Men enjoy conflict more than women do -- it's a game!*

☐ Never ☐ Rarely ☐ Sometimes ☐ Often ☐ Always

i) *Arguments should be avoided in a serious, loving relationship.*

☐ Never ☐ Rarely ☐ Sometimes ☐ Often ☐ Always

Now, administer this survey to a member of the opposite gender, someone who you are close to (a family member or friend will do). Are their answers significantly different? Discuss the similarities and differences between your answers with this other person and report the results of your discussion here:



8. Negotiation is often (though not always) employed to resolve conflict. Ethical and effective negotiation is a process with these components:

- *Focus on the problem, not participants.*
- *Focus on wants and needs, not positions.*
- *Adhere to mutually agreed upon guidelines while negotiating.*
- *Explore options.*
- *Develop the best option for mutual satisfaction.*

- Identify the unethical, ineffective negotiation tactics below:**

9. Do you believe the effective negotiation strategies for people in the US will equally as effective for people in Japan? Why or why not?

The image shows an open book with two pages of handwritten text. The handwriting is a dense, cursive script, likely from the 18th or 19th century. The pages are filled with text, with some lines appearing slightly more prominent than others. The central gutter shows the binding of the book. The overall appearance is that of a historical manuscript or a personal journal.

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Principles of Communication

Exercise H: Conflict

Your Name: _____

Read Chapters 7, 8 and Appendix A in *An Introduction to Human Communication* before you complete this exercise. This assignment is due between [dates inserted here], but no later than Friday, noon.

1. Many misconceptions have developed concerning conflict. Measure your perceptions of conflict below. Rate each dimension of conflict by selecting one option ranging from "never" to "always."

- a) Conflict is abnormal. ☐ Never ☐ Rarely ☐ Sometimes ☐ Often ☐ Always
- b) Conflict is destructive. ☐ Never ☐ Rarely ☐ Sometimes ☐ Often ☐ Always
- c) Conflict happens when communication is ineffective, because effective communication prevents conflict. ☐ Never ☐ Rarely ☐ Sometimes ☐ Often ☐ Always
- d) Conflict must be resolved quickly. ☐ Never ☐ Rarely ☐ Sometimes ☐ Often ☐ Always
- e) Conflict must be resolved by compromise. ☐ Never ☐ Rarely ☐ Sometimes ☐ Often ☐ Always
- f) The only way to end conflict is to win. ☐ Never ☐ Rarely ☐ Sometimes ☐ Often ☐ Always
- g) Women handle conflict more constructively than men do. ☐ Never ☐ Rarely ☐ Sometimes ☐ Often ☐ Always
- h) Men enjoy conflict more than women do -- it's a game! ☐ Never ☐ Rarely ☐ Sometimes ☐ Often ☐ Always
- i) Arguments should be avoided in a serious, loving relationship. ☐ Never ☐ Rarely ☐ Sometimes ☐ Often ☐ Always

Now, administer this survey to a member of the opposite gender, someone who you are close to (a family member or friend will do). Are their answers significantly different? Discuss the similarities and differences between your answers with this other person and report the results of your discussion here:

2. Negotiation is often (though not always) employed to resolve conflict. Ethical and effective negotiation is a process with these components:

- Focus on the problem, not participants.
- Focus on wants and needs, not positions.
- Adhere to mutually agreed upon guidelines while negotiating.
- Explore options.
- Develop the best option for mutual satisfaction.
- Cope with resistance.
- Deal with unethical negotiation tactics.
- Praise effective negotiation tactics and successful outcomes.

Identify the unethical, ineffective negotiation tactics below:

- ☐ Dominating the conversation.
- ☐ Suggesting that someone should compromise this time because they "won" last time.
- ☐ Eliciting or recording embarrassing comments for later use.
- ☐ Validating a participant's comments.
- ☐ Accepting responsibility for part of the conflict.
- ☐ Disclosing your point of view.

3. Do you believe the effective negotiation strategies for people in the US will equally as effective for people in Japan? Why or why not?

That's it! You have finished online exercise H! Now submit this form and print a copy for yourself.

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Principles of Communication

Exercise I: Interpersonal Relationships

Your Name:

Read Chapters 7, 8 and Appendix A in *An Introduction to Human Communication* before you complete this exercise. This assignment is due between [dates inserted here], but no later than Friday, noon.

1. Let's examine your philosophy about interpersonal relationships and love.

a) If my partner really loves me, we won't have any quarrels. ☐ True ☐ False

b) If my partner really cares, s/he will always feel affection for me. ☐ True
☐ False

c) My partner should know what is important to me without my having to tell him/her. ☐ True ☐ False

d) If my partner really cares, s/he will always do what I ask. ☐ True ☐ False

e) If my partner contradicts me, I think s/he doesn't have much respect for me.
☐ True ☐ False

f) If my partner hurts my feelings, that is because s/he is mean. ☐ True ☐ False

Do you believe that the ideas above are unrealistic (if you marked true to any, you accept that idea as *realistic*)? How has your culture shaped your relationship

expectations?

2. Many people feel intimidated or nervous when they have to participate in a conversation with a complete stranger, but we can develop strategies for coping with these situations. List five coping strategies for engaging in "small talk" with a stranger and assume this stranger isn't from your cultural background:

3. Here's a totally unscientific quiz about forming perceptions of people. Answer each of the following questions quickly.

Name your favorite color:

Describe that color in three words (example: blue -- cool, relaxing and distant).

--	--	--

Name your favorite animal:

--

Describe that animal in three words (example: tiger -- strong, tense, dangerous).

--	--	--

Name your favorite city:

--

Describe that city in three words (example: New York -- exciting, busy, refreshing).

--	--	--

The quiz can be interpreted this way: The descriptors for your favorite color provide clues to how other people view you. The descriptors for your favorite animal provide clues as to how you view yourself. The descriptors for your favorite city provide clues for how you feel about your sensuality.

How do you feel about the results of this exercise? To what degree might this exercise provide valid clues about you?

--	--	--

What are the risks and costs associated with using limited and indirect clues to categorize and describe people?

--	--	--

That's it! You have finished online exercise I! Now submit your answers and save a copy of this form for your records.

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Principles of Communication

Exercise J: Interviewing Skills

Your Name:

Read Chapter 9 in *An Introduction to Human Communication* before you complete this exercise. This assignment is due anytime between [dates inserted here, but no later than Friday, noon.

1. You have been selected to serve on the search committee for a new William Penn College academic dean. List five questions you want to ask during the initial interview. All questions must be legal.

2. Indicate which questions below are "closed" and which are "open-end":

Open ☐ Closed ☐ What would you like to know about our company?

Open ☐ Closed ☐ Have you had experience supervising employees?

Open ☐ Closed ☐ What was your GPA in college?

Open ☐ Closed ☐ What is your greatest strength as a potential employee?

Open ☐ Closed ☐ How long have you been living in the area?

Rewrite the closed-end questions so they are open-end:

3. Indicate whether the following questions are "neutral" or "leading" (also called "biased"):

Neutral ☐ Leading ☐ 1. What do you think about the new Student Government Association?

Neutral ☐ Leading ☐ 2. Don't you think this class is fantastic?

Neutral ☐ Leading ☐ 3. Aren't you worried about your grades?

Neutral ☐ Leading ☐ 4. What do you think about the WPC job fair?

Neutral ☐ Leading ☐ 5. Have you quit your job yet?

Rewrite the "leading" questions so they are "neutral":

Now, identify each neutral question above (include the ones you rephrased) as (a) clearinghouse, (b) nudging, (c) reflective, or (d) informational.

4

That's it! You have finished Exercise J! Print a copy of your answers and submit this form.

Go to Exercise K!

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Exercise K: Small Group Interaction

Read Chapter 10 in *An Introduction to Human Communication* before you complete this exercise. This exercise is due between [dates inserted here], but no later than noon, Friday.

Idea-generation group (members formulate creative concepts)

Information-sharing group (members seek, synthesize, and communicate information)

Rationale for your selection:

2. How many people will you invite to serve on your group? _____

Rationale for this _____

3. Who will you select to serve on your group? (Identify by roles, positions, titles -- not names.)

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4. What decision-making strategies will you employ?

- ☐ Authority (where the leader of the committee makes decisions, usually after the group has had an opportunity to process information and make recommendations for the leader's consideration; tends to be an efficient strategy for reaching decisions, but may leave members feeling unappreciated or ignored)
 - ☐ Majority rule (where a majority of the members make decisions, usually after a formal vote is taken; allows all members to participate in decision making, may help facilitate heated debate, and is advantageous when compromise from some members is unlikely, but may leave some members feeling left out)
 - ☐ Consensus (where all group members are brought to the same decision through discussion until consensus occurs; allows maximum participation in decision making and thorough discussion of aspects, but may take more time than other strategies and may require more compromise for some members of the group)
- Rationale for your decision-making

strategy: 

5. What format will your small group utilize?

- ☐ Round table or "interactive group" style (members sit at a round table; tends to encourage equality in interaction)
- ☐ Rectangular table or "boardroom" style (members sit at a rectangular table or tables; tends to encourage participation, yet allows a leader to sit alone at one end of the rectangle and lead both verbally and nonverbally)
- ☐ Panel or "conference" style (members sit at a "head" table, facing an audience; tends to encourage the perception that the group has valuable information to share, or that the panel is highly interested in the information and/or opinions of the audience)
- ☐ Symposium or "classroom" style (individual members address the audience one at a time; tends to encourage the perception that individual members are experts and have valuable information to share)

Rationale for your seating

format: 

6. As a leader, will you encourage or discourage "group fantasy"? Explain your answer!

That's it! You have finished Exercise K! Remember to print a copy of your answers and to submit this completed form.

Go to Exercise L!

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Principles of Communication

Exercise L: Leadership in Group Interaction

Your Name: |

Read Chapter 11 in *An Introduction to Human Communication* before you complete this exercise. This assignment is due [dates inserted here], but no later than Friday, noon.

1. One of the more interesting aspects of leadership is that we rarely are one (a leader) unless our fellow group members perceive us to be one. How would others characterize you as a leader? Think of a situation in which you had to lead others. Answer the following questions as though you were another group member, assessing the performance of the leader...

- True ☐ False ☐ The leader encouraged all group members to participate.
- True ☐ False ☐ The leader stopped any one member from dominating the group.
- True ☐ False ☐ The leader carefully considered strategies and tactics for group processing.
- True ☐ False ☐ The group had clear goals.
- True ☐ False ☐ The group followed a clear process to achieve those goals.
- True ☐ False ☐ Each member of the group had the opportunity to play a positive role in achieving the group's goals.
- True ☐ False ☐ The leader used an appropriate leadership style (democratic, laissez-faire, or autocratic).
- True ☐ False ☐ The group was successful.
- True ☐ False ☐ The leader was effective in this situation.

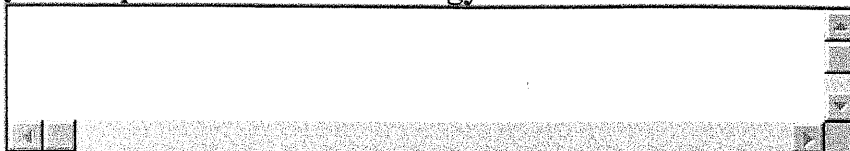
2. Most people in group situations (where they meet on a regular basis) will identify a favorite seat or area and cling closely to it for the duration of the program. As a leader, you can resolve to break up these familiar seating patterns for the benefit of the participants. This can be achieved by using several "mixer" techniques including:

- Switching session room set-ups from "classroom" (with chairs and tables in rows) to auditorium (no tables), or round table (chairs and round tables, no rows), and letting members rotate seats.
- Switching the sizes of work groups for various small-group discussions (e.g. changing the group size from three people to five people).
- Sorting participants into different physical locations according to their views

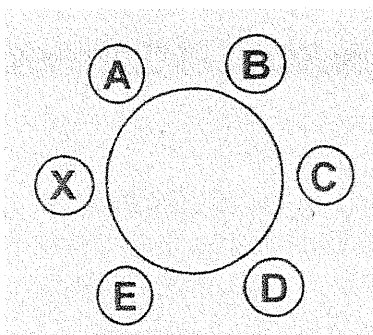
when they disagree on a topic. As reports are presented from the subgroups, allow converts to physically relocate to the other side.

d. Ask participants to select a person they know the least about, identify most closely with, or feel in most disagreement with and let them seek out that person as their conversational partner for the next several minutes.

Select a strategy from those above and discuss the advantages and disadvantages you can perceive with that strategy.



3. Look at the exercise below and imagine where you would sit if you were the group leader, the group was meeting "round table style" (all participants sit at a round table), and the following situations apply. The small circles represent chairs and the large circle is the table; the chair marked with an X is occupied, you can select any other chair.



The meeting is likely to be very tense. One member of the group tends to be dominant (X), often preventing the others from participating. You suspect the dominant person is opposed to your position on today's issue.

Chair A ☐ Chair B ☐ Chair C ☐ Chair D ☐ Chair E ☐

Explain your seat selection:

The meeting is likely to be very tense. You still have that dominant member of the group (X). This time, however, you and that person probably agree on the issue of the day.

Chair A ☐ Chair B ☐ Chair C ☐ Chair D ☐ Chair E ☐

Explain your seat selection:

The meeting is extremely important. One member of the group (X) tends to be quiet and reluctant to share. On today's issue, though, this member holds key information. You want to draw him/her out.

Chair A ☐ Chair B ☐ Chair C ☐ Chair D ☐ Chair E ☐

Explain your seat selection:

The meeting is very important. On today's issue you have two sides, the group is evenly divided. Two people hate the idea, two people love it. One person is

undecided (X). You probably won't vote.

Chair A ☐ Chair B ☐ Chair C ☐ Chair D ☐ Chair E ☐

Explain your seat selection:

4. As a group leader, will you encourage or discourage "groupthink"? Explain your answer!

That's it! You have finished Exercise L! Don't forget to print your answers and submit this form.

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on members of society? Can you provide an example of any?




5. How much of your time is devoted to mass media? Consider yesterday (or pick a recent, typical day in your schedule):

How much time did you spend listening to and/or watching television?



How much time did you spend listening to the radio?



How much time did you spend reading newspapers?



How much time did you spend reading (print) magazines?



How much time did you spend on the Internet?



6. How many people currently living in the US have ever been to Bosnia (in your opinion)? If someone in the US has never been to Bosnia, how does that person learn what is going on in that country? What impression do you think US citizens have of Bosnia, in general? How accurate do you think that impression is? How can we broaden our impressions of other countries?



7. How objective do you believe the mass media to be? For instance, is the Clinton "scandal" being reported by the news media in a fair and objective manner?

Who/what influences the media?



That's it! You have finished online exercise M! Now submit your answers and save a copy for yourself!



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Appendix D
Student Learning Assessments

Principles of Communication

Self-test One

Your Name: _____

This self-test is based on the information covered in Chapters 1-6 in *An Introduction to Human Communication*. This test is designed as a tool to help you measure your understanding of the concepts discussed in these chapters. Use the book as you take this test, to refresh your memory on the terms and examples provided. Some of these questions require critical thinking -- you won't find the answers in the book, but if you read and understood the material in Chapters 1-6, you should be able to interpret the questions and select the correct answers.

Below you will find multiple choice questions (some may have more than one correct answer); fill-in-the-blank questions (some may need more than one word); and true/false questions (only one answer is correct).

This assignment is due between [insert dates here], but no later than Friday, noon.

1. Communication is a process, which means...

- ☐ a. communication is static and unchanging through time.
- ☐ b. communication is an activity, an exchange, or a set of behaviors.
- ☐ c. how we can never just communicate verbally, we must use other forms of communication to augment our verbal messages.

2. Label the three major communication models (your options are linear, interactional, and transactional).

noise noise noise noise noise noise noise noise noise noise noise noise

Sender.....message.....Receiver

noise noise noise noise noise noise noise noise noise noise noise noise

Sender/Receiver.....message.....Receiver/Sender.....message.....Sender/Receiver.....

noise noise noise noise noise noise noise noise noise noise noise noise

Sender.....message.....Receiver.....feedback (message).....Sender

noise noise noise noise noise noise noise noise noise noise noise noise

3. Dyadic communication can also be called what?

4. Developing meaning and concepts within yourself is what kind of communication?

5. "Communication is inevitable," therefore...

- ☐ a. you can control communication completely.
- ☐ b. even when you don't intend to, you often communicate.
- ☐ c. at least two people are required and behavior must be perceived by someone in order to communicate, but once perception takes place, you cannot fail to communicate (even *no* response is communication).

6. "Communication is irreversible and unrepeatable," so...

- ☐ a. you can't "take it back" and you can't communicate twice exactly the same way you did the first time.
- ☐ b. you can always say you're sorry, even if you know you might repeat the mistake.
- ☐ c. you can "go back to the beginning" and "start over, just like nothing happened."

7. In the selection stage of perception, you neglect some stimuli in your environment and focus on others. True ☐ or False ☐ ?

8. In the organization stage of perception, you organize sensory stimulation according to various principles, like proximity. True ☐ or False ☐ ?

9. According to your text, the interpretation stage of perception occurs when you give sensory stimulation meaning and react accordingly. True ☐ or False ☐ ?

10. Your perceptions can be categorized and tend to follow a variety of patterns. Fill in the blanks below, using the following options:

closure effect	Pygmalion effect	similarity effect
proximity effect	figure and ground effect	self-fulfilling prophecy

If I say, "John and Mary keep looking at each other and smile, so I think they are falling in love," I'm providing an example of the .

When an instructor believes some of the students (all of the education majors, for

instance) are exceptionally capable, and all of those students do better in class than the others do, this could be an example of the .

A is believing something will happen in the future ("I am destined to become a professor") and then -- perhaps unintentionally -- proceeding in life to make the belief actually come true.

If you hear your professor say, "Some of you did so horrible on the last exam, I'm going to give all of you a chance to retake it," looking directly at you with a disgusted expression, and you conclude that you must have failed the exam, you are providing an example of the .

Believing most of the negative feedback you receive and not paying attention to the positive feedback you receive is an example of the .

This college has an alumni group -- people who graduated from this college and now maintain an interest in the college's welfare. Such a group of virtual strangers who share a common experience is an example of the .

11. If you participated in a marathon and you managed to cross the finish line with a respectable time, but you felt that you did well primarily because the course was easy and the weather was perfect, would you be demonstrating an internal locus of control reaction or an external locus of control reaction? .

12. According to research conducted by Deborah Tannen, women use more listening cues (than men) that let the other person know they are paying attention and are interested. Men not only use fewer listening cues, they interrupt more. Women tend to talk more about others, men tend to talk more about themselves. So which group -- men or women -- are more likely to be labeled egocentric? .

13. What are the techniques for active listening? (Short answer, keep it brief.)

14. Empathic listening involves the same strategies as active listening, but includes the added responsibility of attempting to understand how the other person feels.

True ☐ or False ☐ ?

15. Describe emotional, logical and personal evidence in critical thinking.

16. If someone uses deductive reasoning to convince you of an issue, what criteria can you use to evaluate the argument?

17. List the ten main errors in critical thinking:

18. List at least five nonverbal skills in effective

listening:

19. Basically, there are four kinds of nonverbal communication: (a) intentional and perceived correctly; (b) intentional and misinterpreted; (c) unintentional and misinterpreted; and (d) unintentionally sent and unintentionally perceived. True ☐ or False ☐ ?

20. Nonverbal codes are codes of communication consisting of symbols that are not words, including nonword vocalizations. True ☐ or False ☐ ?

21. What are Hall's four categories of "proxemics" and what are the distance limits for each?

--	--	--	--

22. What does a firm handshake (held a bit longer than normal and where the juncture between thumbs meet firmly together) convey?

23. Culture dictates nonverbal communication. True ☐ or False ☐ ?

24. Why should you resist the temptation to draw conclusions *based* on nonverbal communication? (Short answer, be brief.)

25. How have you developed your "personal" language, according to the

text?

That's it! You have finished Self-Test One! Be sure to submit your answers and to print a copy for your records.

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Principles of Communication

Self-test Two

Your Name: _____

This self-test is based on the information covered in Chapters 7-11, 19 and Appendix A in *An Introduction to Human Communication*. This test is designed as a tool to help measure your understanding of the concepts discussed in these chapters. Use the book as you take this test, to refresh your memory on the terms and examples provided.

Below you will find multiple choice questions (some may have more than one correct answer); fill-in-the-blank questions (some may need more than one word); and true/false questions (only one answer is correct).

1. According to your text, which of the following interpersonal communication characteristics are needed for effective intercultural communication?

- ☐ a. Defensive communication.
- ☐ b. Empathy and other supportive types of communication.
- ☐ c. Avoiding stereotyping.
- ☐ d. Being tolerant of other attitudes, values, and beliefs.
- ☐ e. Being creative in seeking varied ways to communicate.
- ☐ f. Using and encouraging descriptive feedback.

2. What is the "uncertainty principle" and how does it work?

3. What is assertiveness and how does it differ from aggressiveness?

4. What does androgynous behavior have to do with behavioral flexibility?

5. A persuasive interview could effectively use "neutral" questions, but not "leading" questions. True ☐ False ☐
6. The journalism six-question interview format asks who, what, when, where, why and how. True ☐ or false? ☐
7. An exit interview (an interview conducted when an employee has quit) would be most effective using "open-end" questions like, "What would you change in our processes here if you could?" True ☐ False ☐
8. The counseling interview provides guidance. Therefore, "leading questions" may be used effectively. True ☐ False ☐
9. The problem-solving sequence is used widely in business meetings. The problem-solving sequence includes which of the following:
- ☐ a. Define and analyze the problem.
 - ☐ b. Establish criteria for evaluating solutions.
 - ☐ c. Establish what you need to get from the meeting and how to get it.
 - ☐ d. Identify possible solutions.
 - ☐ e. Evaluate your opponents at the meeting.
 - ☐ f. Evaluate possible solutions.
 - ☐ g. Select the best solution(s).
 - ☐ h. Test the selected solutions (if they work, you're done; if they don't work, try the process again).
10. Select the positive, effective group member roles listed below:
- ☐ a. Ask for facts and opinions, seek clarification of issues.
 - ☐ b. Evaluate members' actions or feelings, provide negative feedback.
 - ☐ c. Pull rank, flatter members, act like the boss, or generally dominate the meeting.
 - ☐ d. Function more as an audience member, rather than an active member.
 - ☐ e. Evaluate group decisions; question logic or practicality of suggestions.
11. What are the key leadership functions in a small group?
- ☐ a. Get the group going.
 - ☐ b. Keep the group on track.

- ☐ e. Family satisfaction is dramatically enhanced by conflict.
- ☐ f. Flexible family members enhance family satisfaction.

19. What is the difference between blended families and extended families?

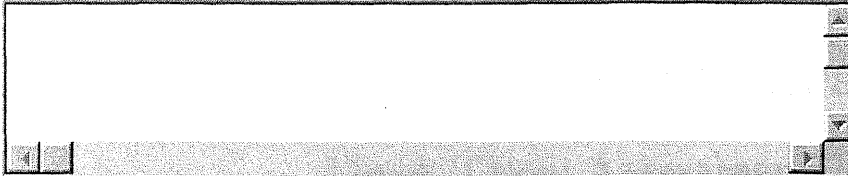
20. Who authored your textbook?

That's it! You have finished Self-Test Two!

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Appendix E
Weekly Course Assessments



That's it! Just submit this form now and print a copy for yourself.



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Principles of Communication

Week Three Assessment

Please complete all other week three assignments before you complete this assessment. This assignment is due between [insert dates here], but no later than Friday, noon.

Your name:

Yes ☐ No ☐ I have responded to the Listserv query for Week Three.

Yes ☒ No ☐ I read the (to date) responses from other students on this topic.

Responding to and reading the Listserv assignment for Week Three, required [] minutes of my time.

Yes ☒ No ☐ I read Chapters 4, 5 & 6 in *An Introduction to Human Communication*.

To read these chapters, I spent _____ minutes.

The most important concept I gained from this reading was:

[illegible]

Yes ☐ No ☐ I completed the online exercises labeled D, E & F.

Yes ☐ No ☐ I found these exercises useful in processing the information in Chapters 4, 5 & 6.

Please explain your response ("yes" or "no"):

Principles of Communication

Week Four Assessment

Please complete all other Week Four assignments before you complete this assessment. This assignment is due between [insert dates here], but no later than Friday, noon.

Your name:

Yes ☐ No ☐ I have responded to the Listserv query for Week Four.

Yes ☐ No ☐ I read the responses from other students on this topic.

Responding to and reading the Listserv assignment for Week Four, required [redacted] minutes of my time.

Yes ☒ No ☐ I read Chapters 7, 8, 19 & Appendix A in *An Introduction to Human Communication*.

To read these chapters, I spent _____ minutes.

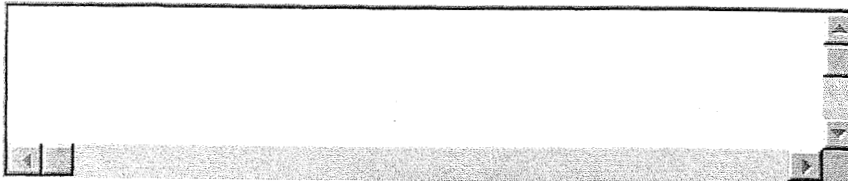
The most important concept I gained from this reading was:

[illegible]

Yes ☐ No ☒ I completed the online exercises labeled G, H, I & M.

Yes ☒ No ☐ I found these exercises useful in processing the information in Chapters 7, 8, 19 and Appendix A.

Please explain your response ("yes" or "no"):



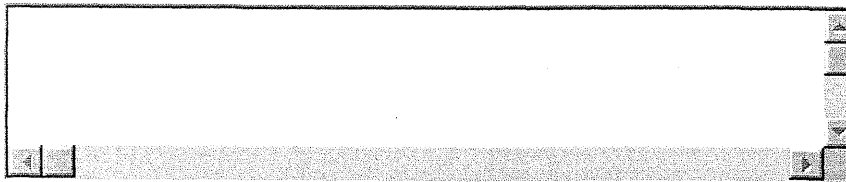
To complete these online exercises (G, H, I & M), I spent minutes.

So far, my general comments about this course are:



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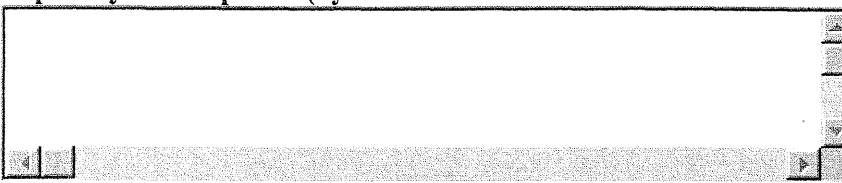
To complete these online exercises (J, K & L), I spent minutes.

Yes ☐ No ☐ I completed Self-Test Two.

Yes ☐ No ☐ I found Self-Test Two useful in measuring my understanding of the materials covered since the last Test.

Please explain your response ("yes" or

"no"):

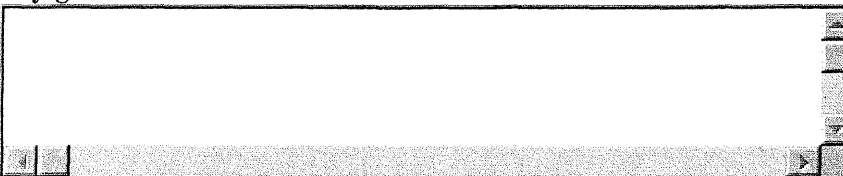


In comparison to other courses I have taken, I believe this course so far has been more ☐ less ☐ time consuming.

Please explain your response:



My general comments about this course are:



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Appendix F

Listserv Queries

Introduction Query

This query was given to students during the first week of the online session. Students were instructed to post their responses on the listserv system, so all students could read all responses. "Send an e-mail message to the Listserv to introduce yourself to the class. State your first and last names, your major, and your favorite hobby. We also want to know what you are an expert at. Don't say, 'nothing!' Pick a topic or activity you could teach us."

Lying Query

This query was sent to students during the third week of the online session. "Is it ethical to exaggerate your virtues and minimize your vices to win approval? How about to get a job? What are your parameters for lying?"

Privacy Query

This query was sent to students during the fourth week of the online session. "Your personal parameters for privacy will influence how you communicate with others. What are your parameters for privacy? Try this as a starting point: Should parents go through their child's room or belongings to find out what the child is doing? Should parents read their child's mail? How about e-mail? Do children have a right to privacy? What if the "child" is really an adult, living at home?"

E-mail Quality Query

This query was sent to students during the fifth week of the online session. "Your Listserv query is different this week. Please go to the Internet and find this page: [Web page address inserted here]. Read through the ten tips provided about composing effective e-mail. Then compose a response for the class about how you think we have been doing in our e-mail 'conversations.' Use another student's work as an example of your point(s). Have we been concise? Have we communicated clearly? Have we paid attention to guidelines for effective communication (like spelling)? What could we do to improve our e-mail communication?"

Appendix G
Orientation Exercise

Principles of Communication

Orientation Exercise

Your name:

This assignment is due no later than Friday, [insert date here], noon.

Part I - Computer Literacy and Preparation for an Online Course

Please rate your computer literacy on the following items by selecting 1 (not even close to describing me or my situation) to 5 (that's me!).

Not meDefinitely me!

- 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ My online communication skills are excellent.
- 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ I can get on the WWW and do simple searches.
- 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ I know how to send email.
- 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ I know how to use listservs.
- 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ I have a place in my home or at work with computer access and where I can work or study for extended periods (30 minutes to 2 hours) without interruption.
- 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ I have someone or resources nearby to help me with any technical problems that may develop while I am working online.
- 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ I read my email regularly and respond within 24 hours when appropriate.
- 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ I am an independent, self-directed learner.
- 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ I usually have no trouble meeting deadlines.

If you haven't already, please send an email message to [insert email address here] to let Professor Reed know you have completed this assignment.

If you haven't already, please send an email message to Listserv to introduce yourself to the class. State your first and last names, your major, and your favorite hobby. We also want to know what you are an expert at -- don't say "nothing"! Pick a topic or activity you could teach us.

Part II - Content Literacy and Preparation for this Communication

Course

- Yes ☐ No ☐ I can list several key considerations for effective electronic communication.
- Yes ☐ No ☐ I can compare various group roles in terms of benefits and costs for each.
- Yes ☐ No ☐ I can describe the necessary steps for developing an effective speech.
- Yes ☐ No ☐ I can list the benefits and costs of five key strategies for conflict management.
- Yes ☐ No ☐ I can explain how changes in physical, cultural, social-psychological and temporal contexts change the meaning in communication.
- Yes ☐ No ☐ I can list the main barriers to effective communication and can offer suggestions for avoiding or overcoming these obstacles.
- Yes ☐ No ☐ I can compare the characteristics of verbal and nonverbal communication.
- Yes ☐ No ☐ I can list the characteristics of active listening.
- Yes ☐ No ☐ I can easily discern the difference between facts and inferences.
- Yes ☐ No ☐ I can clearly differentiate between confirming and disconfirming communication.

Part III - Communication Skills and Preparation for Skill Practice

- 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ My interviewing skills (as an interviewer and interviewee) are highly developed.
- 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ I look for meaning not only in words but in nonverbal behavior as well.
- 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ I use self-disclosure carefully, weighing the benefits and the costs.
- 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ My self-concept is clear, well-defined, and as accurate as possible.
- 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ I recognize stereotyping in my perceptions and in the communications of others.
- 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ I frequently practice my public speaking skills.
- 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ I frequently practice my written communication skills.
- 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ I own and know how to use a handbook for MLA writing guidelines.
- 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ My interpersonal communication skills are highly

developed.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ I am an effective leader in small group interactions.

Part IV - All About You

How old are you? 18-24 ☐ 25-30 ☐ 31-35 ☐ 36-40 ☐ over 40 ☐

What is your gender? male ☐ female ☐

What is your occupation (write "none" if applicable)?

What is your major (write "none" if applicable)?

What is your religious orientation? Christian ☐ Other ☐ None ☐ I prefer not to say ☐

What is your political orientation? Liberal ☐ Moderate ☐ Conservative ☐

What grade do you hope to achieve in this class? A ☐ B ☐ C ☐ D ☐ F ☐

That's it! You've finished the Orientation Exercise. Now print a copy of your responses (for your records) and use the "submit form" button below to submit this exercise to your instructor.

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Appendix H
Participation Consent Form

Study Participation Consent Form

Brief explanation of experiment

You have been invited to participate in data collection for a dissertation, which is a qualitative case study of programmed computer based instruction delivered online. Students who agree to participate will interact with the course in precisely the same manner as students who elect not to participate. The work completed by students over the five-week period of this class will be printed and monitored for descriptive purposes, to determine how the registered students interacted with course content and delivery via the Internet and to examine the issue of course efficiency. The purpose of the study is to explore a course that is developed as computer based instruction delivered online, not to experiment with participants or the instruction in which they are engaged. Therefore, the study is conducted as an observation, not an intervention procedure.

Description of any foreseeable risks or discomforts

No foreseeable risks or discomforts are predicted for participants in this case study, other than a potential for frustration if equipment and/or software behave unpredictably. A variety of backup systems will be in place to help students who experience difficulties connecting with the course content online, including use of telephone connections, regular postal service, face-to-face instruction, and alternate connections available through the computer system (all students are required to have an email account at this college and those accounts are systematically monitored).

Description of any benefits to the subject, including payment, if any

You will receive no benefits from participation in the case study and your grade will not be affected by your decision to (or not to) participate.

Privacy and confidentiality statement

Your work and responses in this class will receive the highest level of privacy possible in relation to the case study. The dissertation will not identify the college, the students, or the work by participants of the study. All participant responses are possible material for quoting in the dissertation, but confidentially will be guarded to the fullest extent possible.

Contact

If questions arise during this case study, you may contact B. J. Reed; phone [phone numbers inserted here]; email [email address inserted here].

Voluntary participation

While I hope all students will participate, you may elect not to. If you choose to participate, you also have the right to refuse to participate further at

any time during the five week course, without repercussion. Course content and assignments are not affected by participation or refusal to participate.

I have read this consent form and understand its contents and my rights relating to participation or non-participation in this dissertation project. I agree, by signing below, to participate.

Student signature

Date

Witness signature

Date

Send this signed form to: B. J. Reed [address inserted here].

Appendix I
A Qualitative Case Study Audit Trail

Study: A Case Study of Programmed Computer-Assisted Instruction in a College Course Delivered Online

Researcher (auditee): B. J. Reed

Auditor: Lynn Kendall

Date of audit: December 1998-January 1999

Guidelines: This audit was conducted using guidelines suggested by Lincoln and Guba (1985) and Merriam (1988). The Halpern model described by Lincoln and Guba (1985) includes five stages, which were applied for this audit and have been described in this report. Merriam (1988) discussed the issues of validity and reliability in qualitative case studies and both issues were explored and have been included in this report.

Stage 1: Pre-entry. The researcher contacted the potential auditor in October to determine if an audit was advisable. The potential auditor determined an audit should be conducted and the auditee provided an outline of available auditing materials. The auditor agreed that objectivity was possible during the audit process, even though the auditor was familiar (through numerous discussions) with the study prior to agreement to conduct the audit. The auditor was a college graduate with a high level of proficiency in quantitative and qualitative research, as well as computer software used in the study, and felt qualified to determine the dependability, confirmability, validity, and reliability of this study.

Stage 2: Determination of auditability. In early December 1998 the auditee submitted all collected data, discussion of the study and methodologies employed, and a summary of the findings. The auditor examined these materials and determined that the audit trail was complete, the trail was comprehensive, that it was useful, and that it was clearly linked (Lincoln & Guba, 1985, p. 322).

Stage 3: Formal agreement to audit. The auditor and auditee entered into a formal agreement to complete the audit, following the Halpern model (Lincoln & Guba, 1985). The audit was to be completed prior to submission of the final dissertation to the advisory committee or no later than December 31, 1998. The agreed upon goal of the audit was to establish dependability and confirmability following the Halpern model and a check on reliability and validity following the guidelines suggested by Merriam (1988). The auditor took possession of all audit materials and conducted the audit in the confines of her own facilities, with the auditee available for consultation by e-mail or phone. The auditor agree to provide a verbal report and would provide approval of the written summary of that report supplied by the auditee as an appendix to the dissertation. The auditee and auditor agreed to discuss any discrepancies or faults discovered through the audit process and in the report until mutual agreement was possible.

Stage 4: Determination of trustworthiness. The auditor reviewed the dissertation (prior to final committee approval), as well as data collected (including the researcher's reflective journal and daily log, a transcript of interviews, and the computer generated copies of e-mail, assessments, and online exercises). Based on these reviews the auditor found . . .

(a) The findings in this study are dependable, based on conclusions that appropriate and complete data were explored, the auditee avoided early closure by conducting a thorough case study, and the methodology was appropriate to the purpose of the study.

The auditee collected student assessments of the online experience and triangulated those assessments with professor assessments (interviews and the reflective journal/daily log), student performance (online exercises), and peer review of student performances (listserv activities). The case study involved purposive sampling, selecting two sections of a specific college course delivered online and relied upon student volunteers in those two sections. The auditee tested the online course paradigm prior to the case study and revised that paradigm slightly before initiating this case study. A sampling of collected data indicated that student performance was confirmable. The data were analyzed for similarities, dissimilarities, trends and identifiable categories. A sampling of data indicated that categories reported were exhaustive, although

some overlap could be found between categories listed under "benefits" and "barriers" (data may fit into more than one category).

(b) The findings in this study are confirmable, based on the conclusions that the findings were grounded in the data, the conclusions were logical, the auditee relied on triangulation to avoid inquirer bias, and the auditee introduced thorough analysis of the data, both negative and positive.

The auditee used naturalistic inquiry methods of analysis proposed by Lincoln and Guba (1985) and case study analysis methods suggested by Merriam (1988). The auditor was able to trace all direct quotes across data and agreed with all identified themes and categories. The groupings had evidence of discernible and clear logic. Relying on a system of member checking by checking throughout the data collection and data analysis stages with the second professor in the case study, as well as by requesting a critical analysis of the results chapter from that peer, the researcher controlled researcher bias. The researcher's journal provided evidence that member checking also occurred in the week following the online course, when the researcher shared a sampling of her findings with students who confirmed their assessments of the experience.

(c) The study contains evidence of validity, with accommodation for the qualitative nature of the study. According to Lincoln and Guba (1985),

"The naturalist cannot specify the external validity of an inquiry; he or she can provide only the thick description necessary to enable someone interested in making a transfer to reach a conclusion about whether transfer can be contemplated as a possibility" (p. 316). Merriam (1988) pointed out that "qualitative case studies usually have high internal validity" but generalizing from a case study to another situation is nonsensical (p. 173).

This case study, following guidelines suggested by Merriam, provided a "rich, thick description" of the case so decisions of transferability can be made by readers of the dissertation. Internal validity, again following Merriam's guidelines, is evidenced by the use of triangulation of data, member checking, peer evaluation throughout the process of collecting and analyzing data, and by accounting for researcher biases (triangulation, peer collaboration, researcher's journal, and the audit trail).

(d) This case study provides evidence for reliability, with accommodation for the qualitative nature of the study. Merriam dictated the qualitative case study must present a comprehensive literature review, which this study has included. Triangulation of data and a thorough audit trail are also evidence of reliability. This case study satisfied those requirements.

Stage 5: Audit closure. The auditor provided the auditee with feedback from the audit. This report was provided to the researcher on January 14, 1999 to be included in the dissertation. This audit serves only as verification that the research methods specified in the dissertation were used and that the findings appearing in the dissertation were grounded in the data revealed in this case study. This audit does not reflect on the quality of the study purpose nor the interpretation of findings. This audit is considered complete by the auditee and auditor.